



UNIVERSITÀ DEGLI STUDI DI MILANO

Dipartimento di Scienze Agrarie e Ambientali

Il ruolo del verde urbano

Giulio Senes



4-5-6 maggio 2018– AUTODROMO NAZIONALE MONZA

PROGETTARE PER L'INVARIANZA

REGOLAMENTO REGIONALE N. 7 DEL 23.11.2017:
CRITERI E METODI PER IL RISPETTO DEL PRINCIPIO DELL'INVARIANZA IDRAULICA E IDROLOGICA
AI SENSI DELL'ART. 58 BIS DELLA L.R. 12/2005

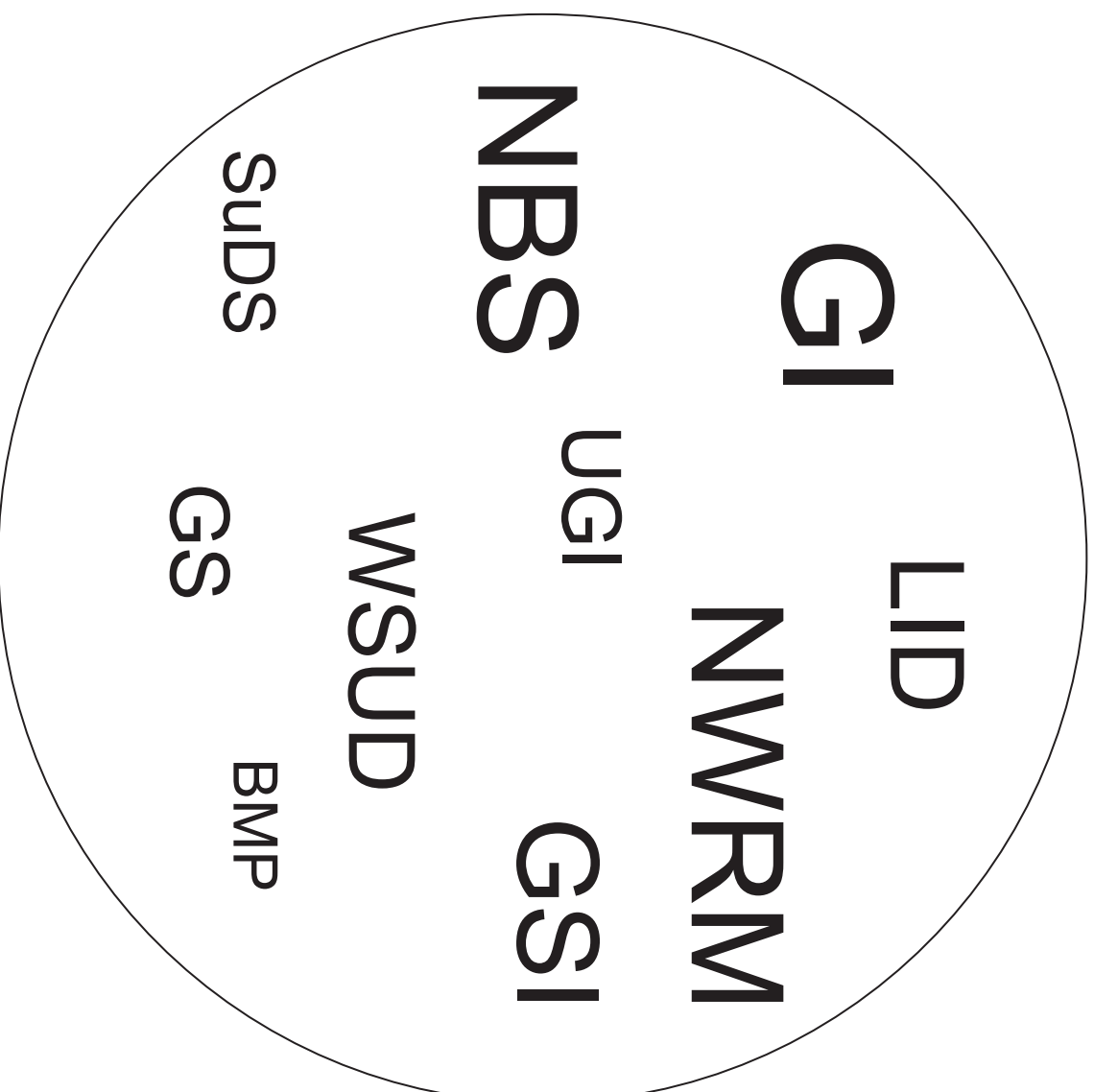
Introduzione

Il ruolo del verde urbano
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Introduzione

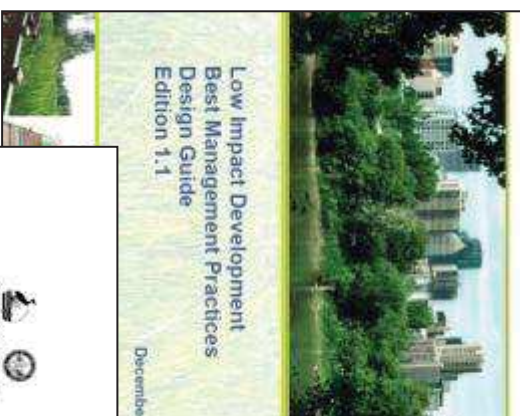
Il ruolo del verde urbano Giulio Senes

Green Stormwater Infrastructure in Seattle
Implementation Strategy 2015-2020

EPA
United States Environmental Protection Agency

GREEN INFRASTRUCTURE
CASE STUDIES

Minister of Infrastructure, Planning, Assessment and Civil Administration



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Dipartimento di Scienze Agrarie e Ambientali

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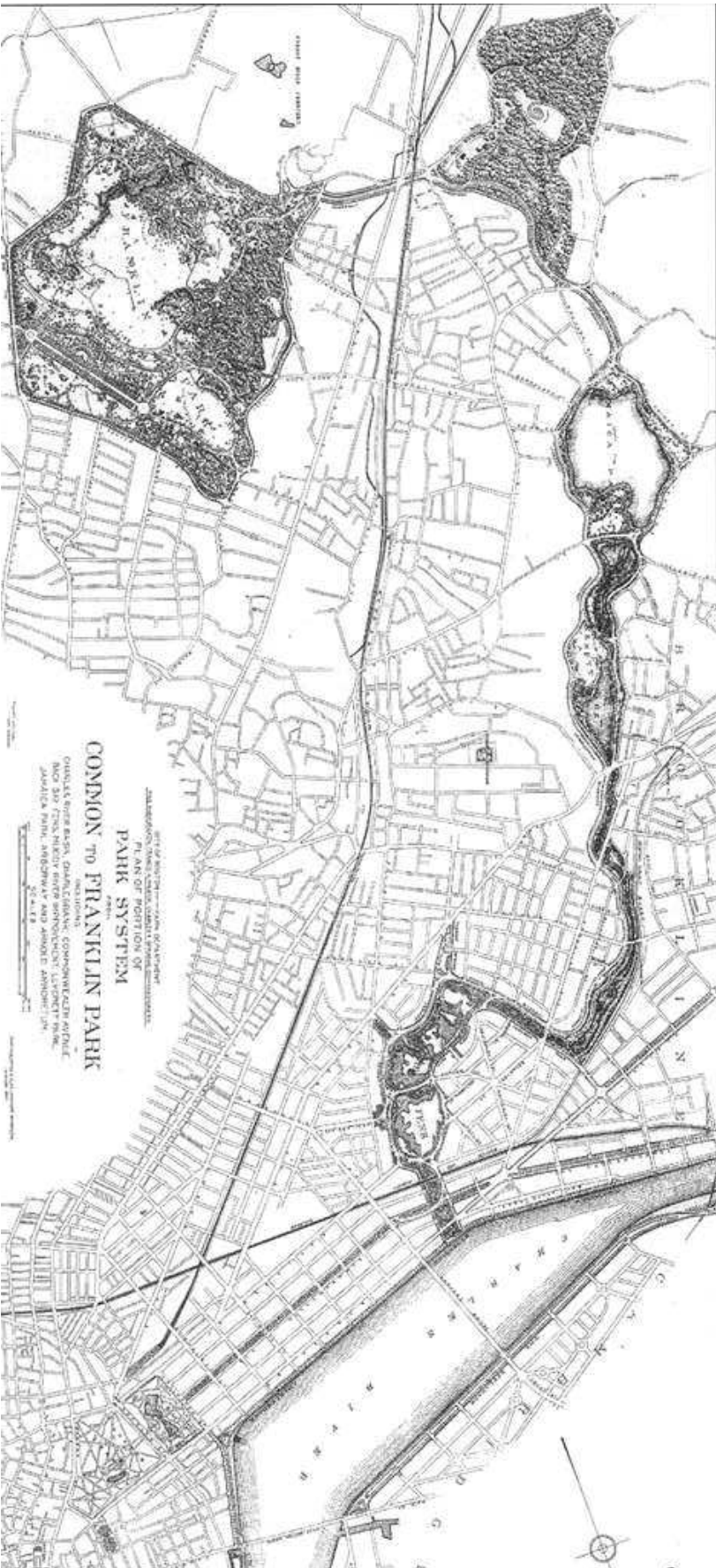


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Dipartimento di Scienze Agrarie e Ambientali

Il ruolo del verde urbano
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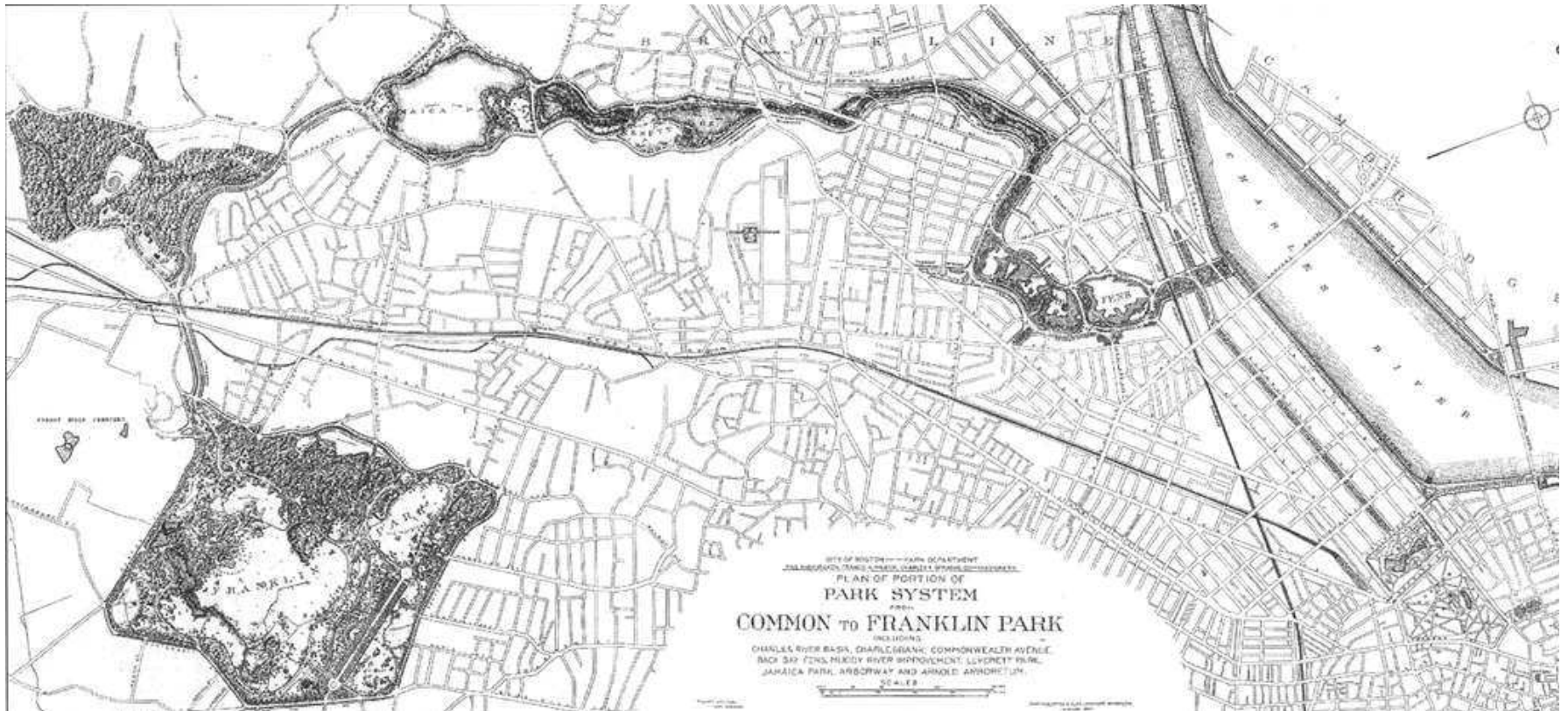




Introduzione

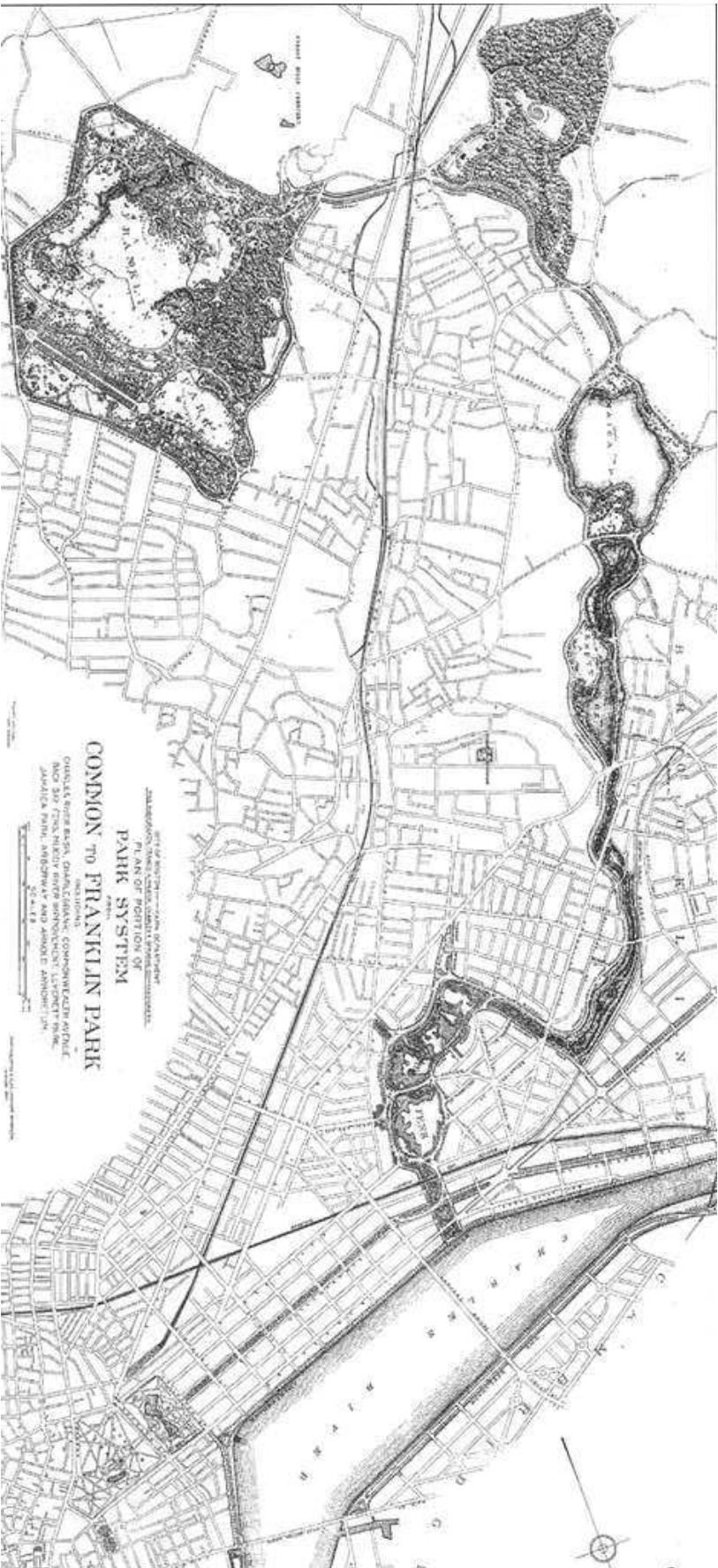
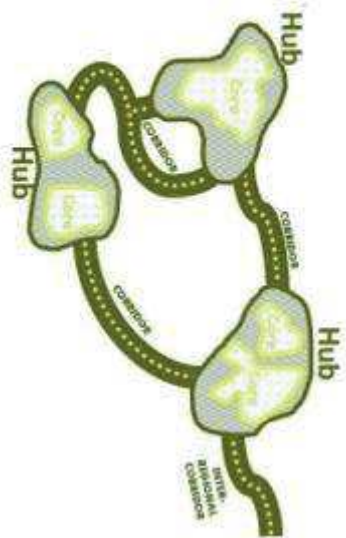
Sistema di “parkways”* per la città di Boston (“Emerald Necklace Park”). Frederick Law Olmsted (1878 – 1890)

***Parkway**: percorsi colleganti le aree verdi con l’obiettivo di estenderne i benefici anche alle aree urbane e suburbane circostanti



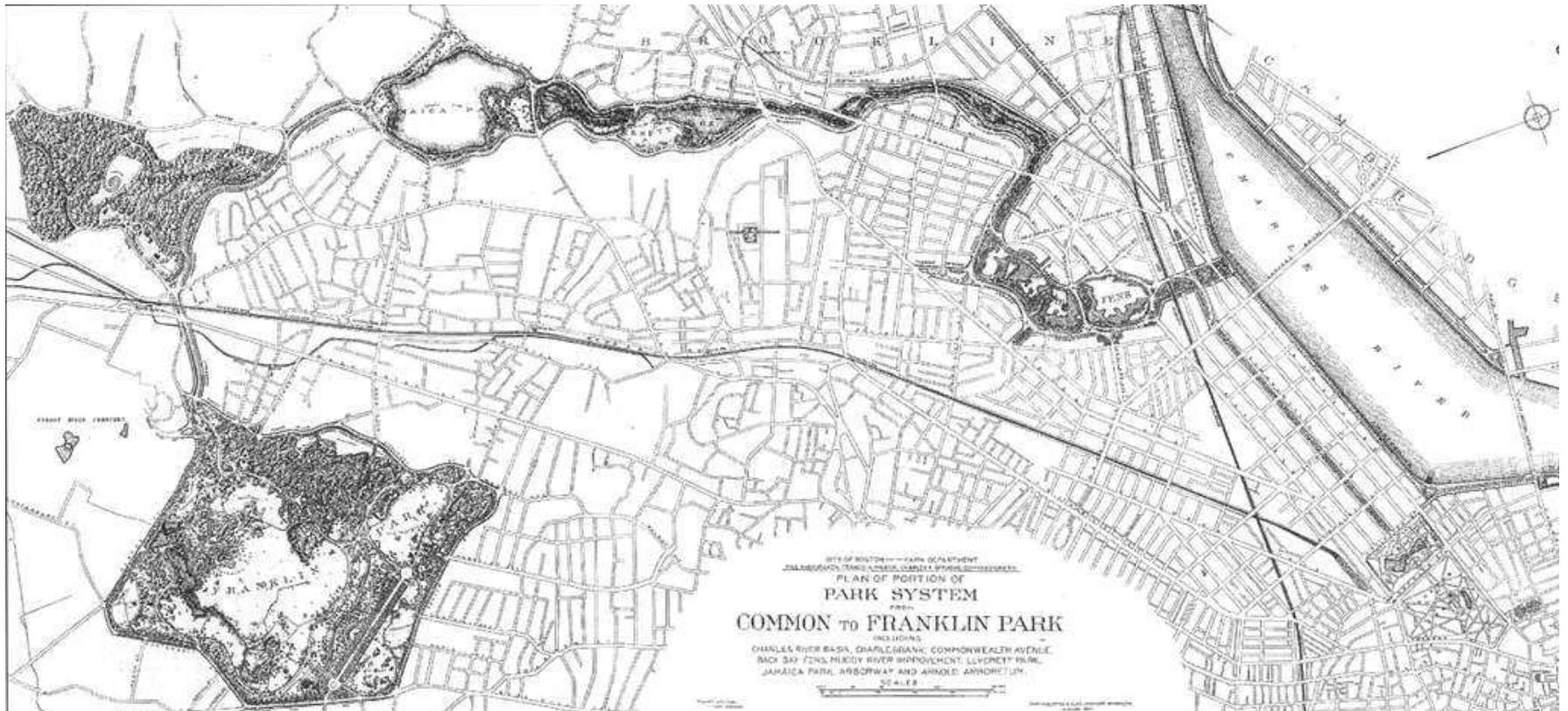


Introduzione



Introduzione

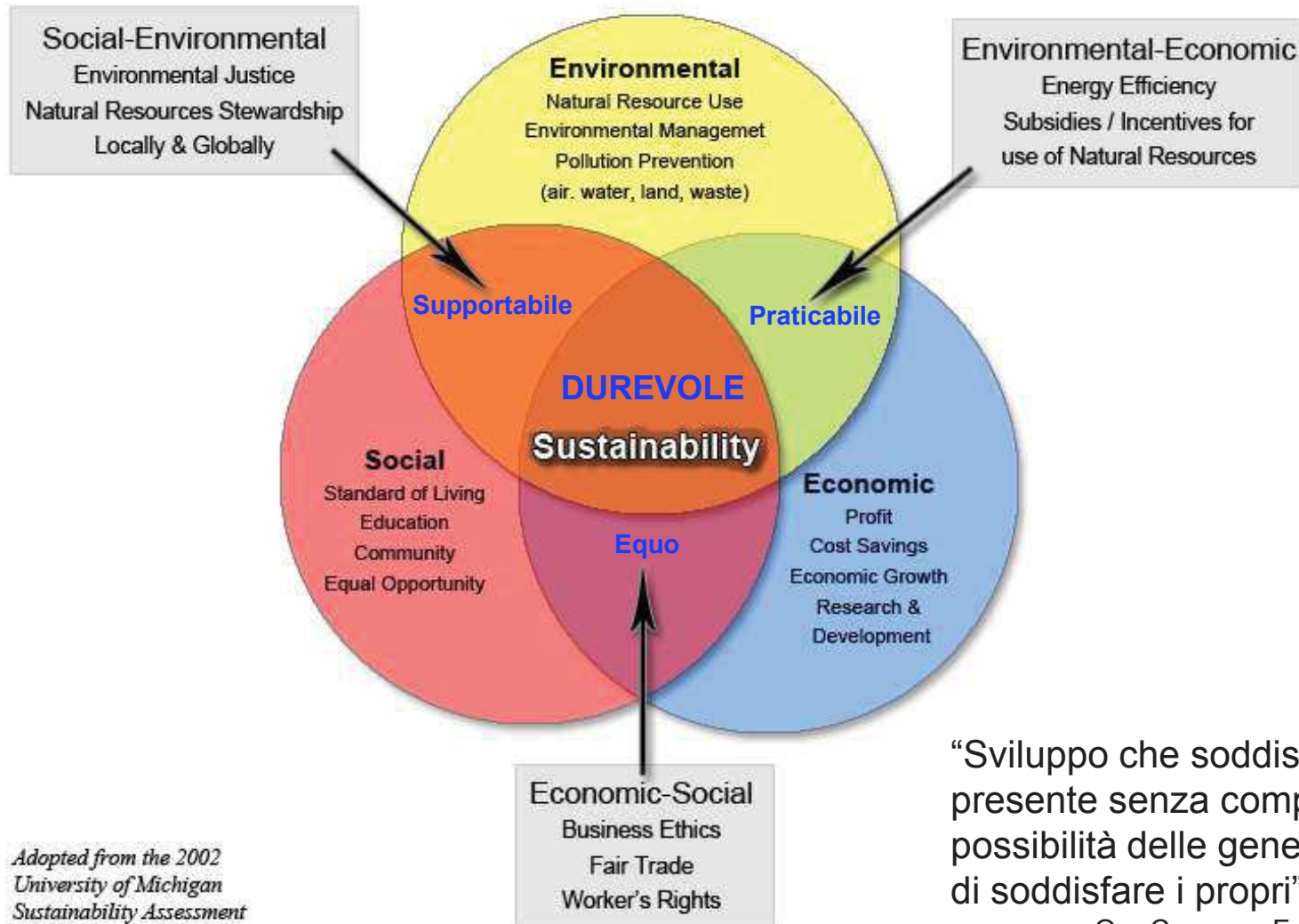
The roots of **landscape architecture** are embedded in both **landscape planning** and **land-use planning**. Frederick Law Olmsted was a landscape planner.



Introduzione



The Three Spheres of Sustainability



*Adopted from the 2002
University of Michigan
Sustainability Assessment*

“Sviluppo che soddisfa i bisogni del presente senza compromettere la possibilità delle generazioni future di soddisfare i propri”

Our Common Future (WCED, 1987)

Introduzione. Servizi Ecosistemici

Il ruolo del verde urbano
Giulio Senes



The screenshot shows the top navigation bar of the Nature journal website. It features a red background with white text for navigation links: nature.com, about npg, news@nature.com, naturejobs, natureevents, help, and site index. The Nature logo is prominently displayed in red. Below the logo is a search bar with a 'Go' button. To the right of the search bar, the issue information is provided: 15 May 1997 Vol 387 No 6630 pp215-315. At the bottom of the header, there are several yellow buttons for user actions: my account, e-alerts, subscribe, and register.

The value of the world's ecosystem services and natural capital

Robert Costanza^{††}, Ralph d'Arge[‡], Rudolf de Groot[§], Stephen Farber^{||}, Monica Grasso[†], Bruce Hannon[¶], Karin Limburg^{#*}, Shahid Naeem^{}, Robert V. O'Neill^{†††}, Jose Paruelo^{‡‡}, Robert G. Raskin^{§§}, Paul Sutton^{|||} & Marjan van den Belt^{¶¶}**

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^{**} Department of Ecology, Evolution and Behavior, University of Minnesota, St Paul, Minnesota 55108, USA

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^{†††} Department of Ecology, Faculty of Agronomy, University of Buenos Aires, Av. San Martin 4453, 1417 Buenos Aires, Argentina

^{‡‡} Jet Propulsion Laboratory, Pasadena, California 91109, USA

^{§§} National Center for Geographic Information and Analysis, Department of Geography, University of California at Santa Barbara, Santa Barbara, California 93106, USA

^{¶¶} Ecological Economics Research and Applications Inc., PO Box 1589, Solomons, Maryland 20688, USA



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Dipartimento di Scienze Agrarie e Ambientali

Introduzione. Servizi Ecosistemici

“Un ‘ecosistema’ è una combinazione complessa e dinamica di piante, animali, microrganismi e dell'ambiente naturale, che insieme costituiscono un sistema unico di elementi interdipendenti.

Gli ecosistemi della Terra forniscono all'umanità tutta una serie di vantaggi che vanno sotto il nome di ‘**servizi ecosistemici**’:

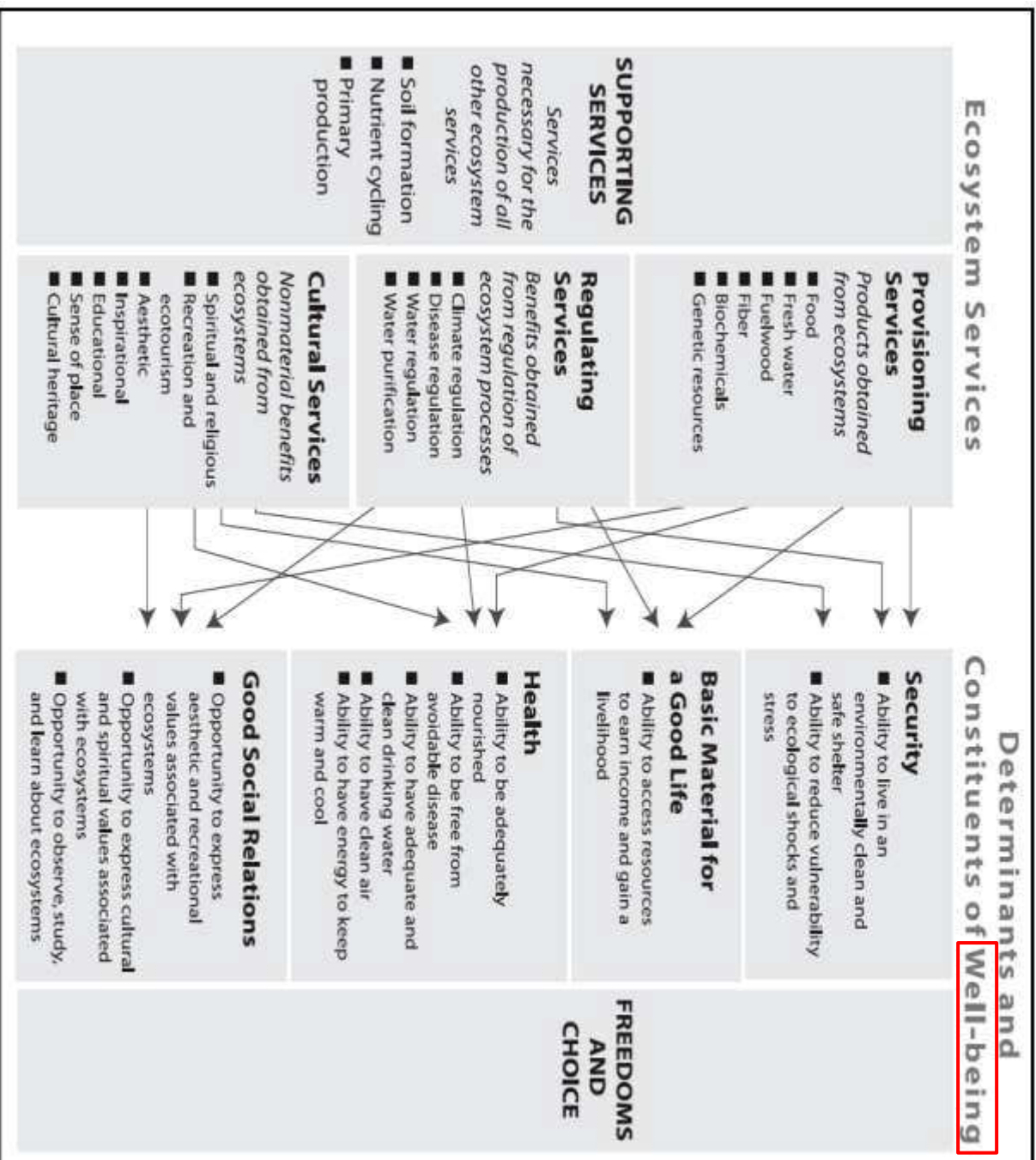
- servizi di approvvigionamento;
- servizi di regolazione;
- servizi culturali;
- servizi di supporto”.

(Unione Europea, 2009)





Introduzione. Servizi Ecosistemici



Introduzione. Il suolo come ecosistema

“Un ‘ecosistema’ è una combinazione complessa e dinamica di piante, animali, microrganismi e dell'ambiente naturale, che insieme costituiscono un sistema unico di elementi interdipendenti.

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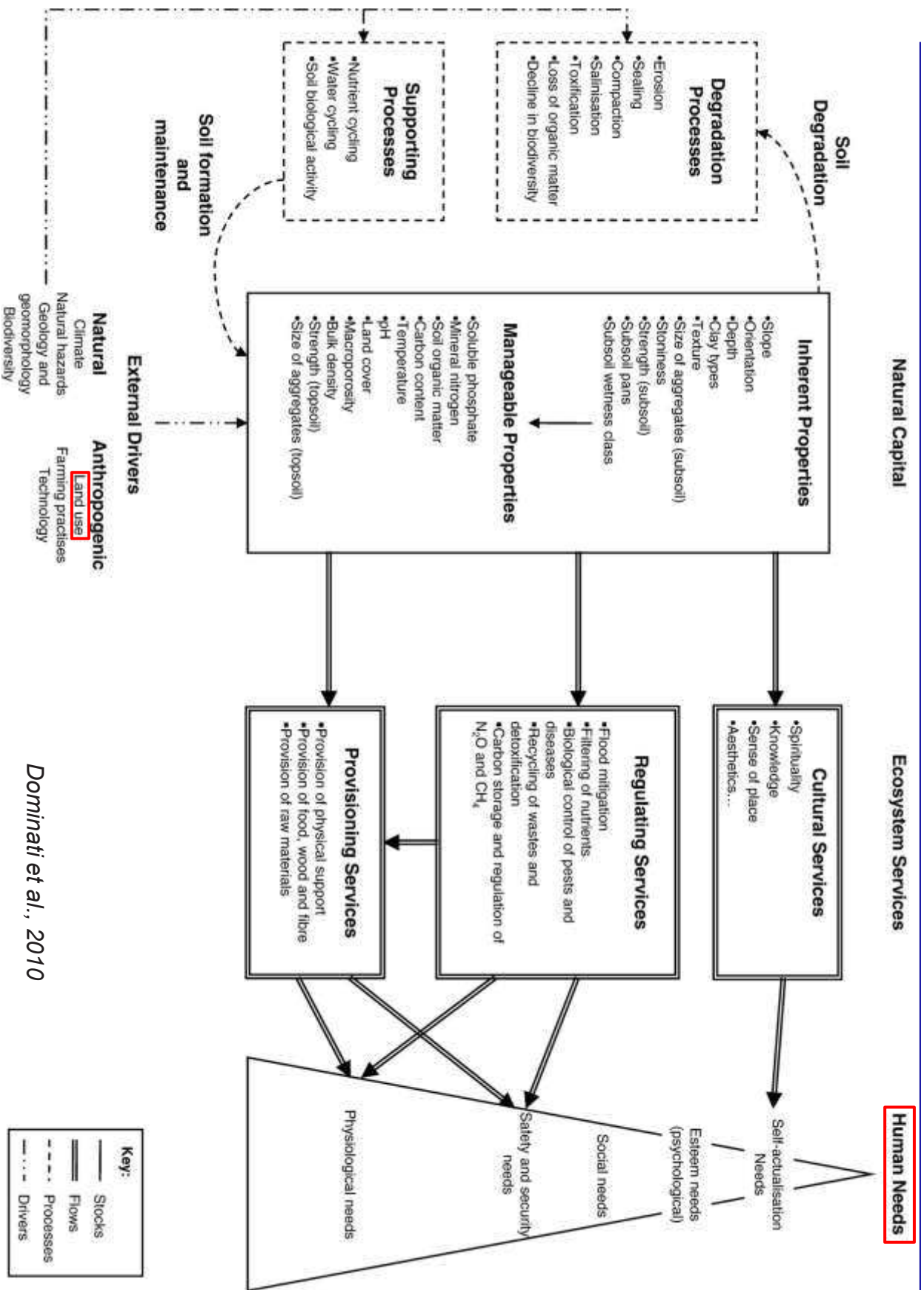
- servizi di approvvigionamento;
- servizi di regolazione;
- servizi culturali;
- servizi di supporto”.

(Unione Europea, 2009)

Consumo di suolo
Land take, Soil sealing

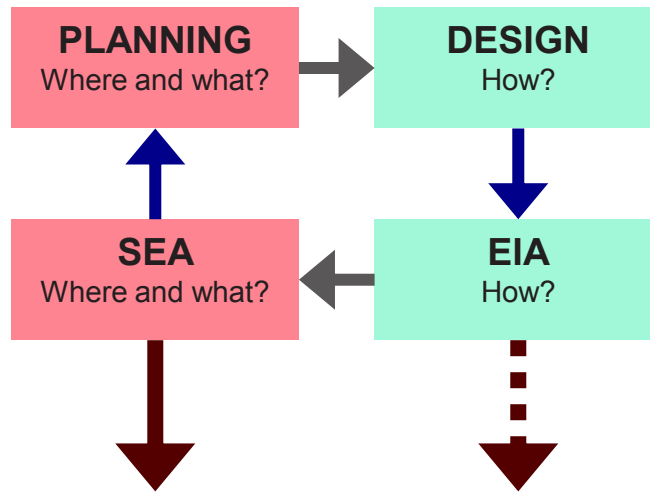


Introduzione. Il suolo come ecosistema



Dominati et al., 2010

Introduzione. L'impatto delle attività umane



Misure previste per **impedire, ridurre e compensare** nel modo più completo possibile gli eventuali effetti negativi significativi sull'ambiente dell'attuazione del piano/progetto

Impatto

Possibili effetti significativi sull'ambiente, compresi aspetti quali:

- la biodiversità,
 - la popolazione,
 - la salute umana,
 - la flora e la fauna,
 - il suolo,
 - **l'acqua**,
 - l'aria,
 - i fattori climatici,
 - i beni materiali,
 - il patrimonio culturale, anche architettonico e archeologico,
 - il paesaggio,
- e l'interrelazione tra i suddetti fattori.

Introduzione. Come agire per il futuro

Il ruolo del verde urbano
Giulio Senes

Regolamentazioni	Incentivi e meccanismi di mercato		Informazione e partecipazione
Definizione di vincoli, obblighi e standard e ambientali	Utilizzo di mercati esistenti, attraverso	Creazione di nuovi mercati, attraverso	
Standard e requisiti minimi di legge Divieti e zone di protezione Permessi, licenze e quote massime di prelievo Zonizzazioni Responsabilità legale	Sussidi, incentivi, contributi Eco-tasse e/o sgravi fiscali Tariffe per acquisto di servizi	Attribuzione/ri-tribuzione diritti di proprietà Compravendita di permessi Compravendita di quote/dritti sui mercati internazionali Compravendita diretta di beni e servizi	Informazione e comunicazione Consultazione degli stakeholder Certificazioni volontarie, <i>green labelling</i> e <i>green marketing</i> Partecipazione ai processi decisionali

Tab. 2: Una possibile tassonomia degli strumenti per la gestione delle risorse ambientali. (World Bank, 2003, modificata)

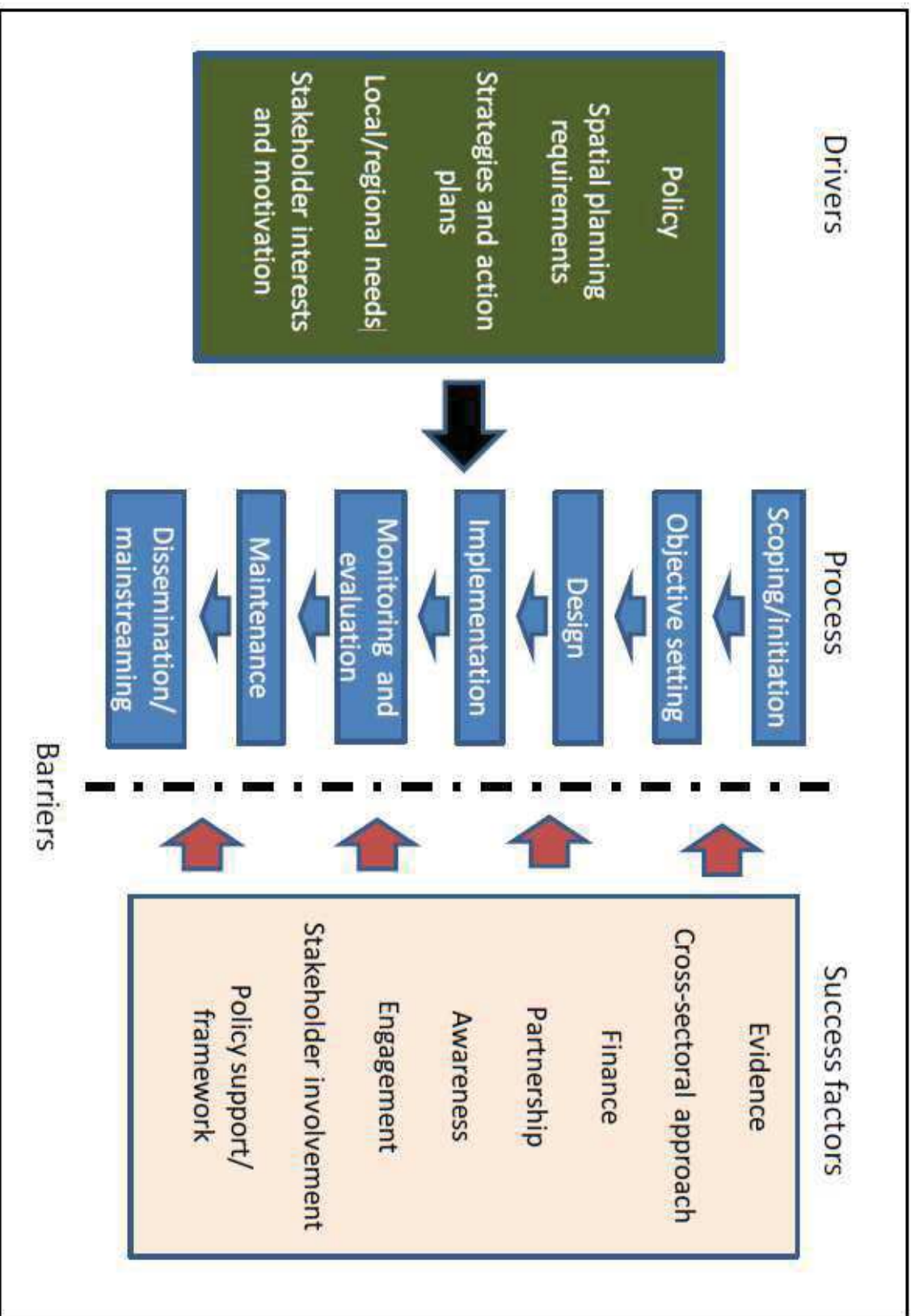


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Dipartimento di Scienze Agrarie e Ambientali



Introduzione. Come agire per il futuro



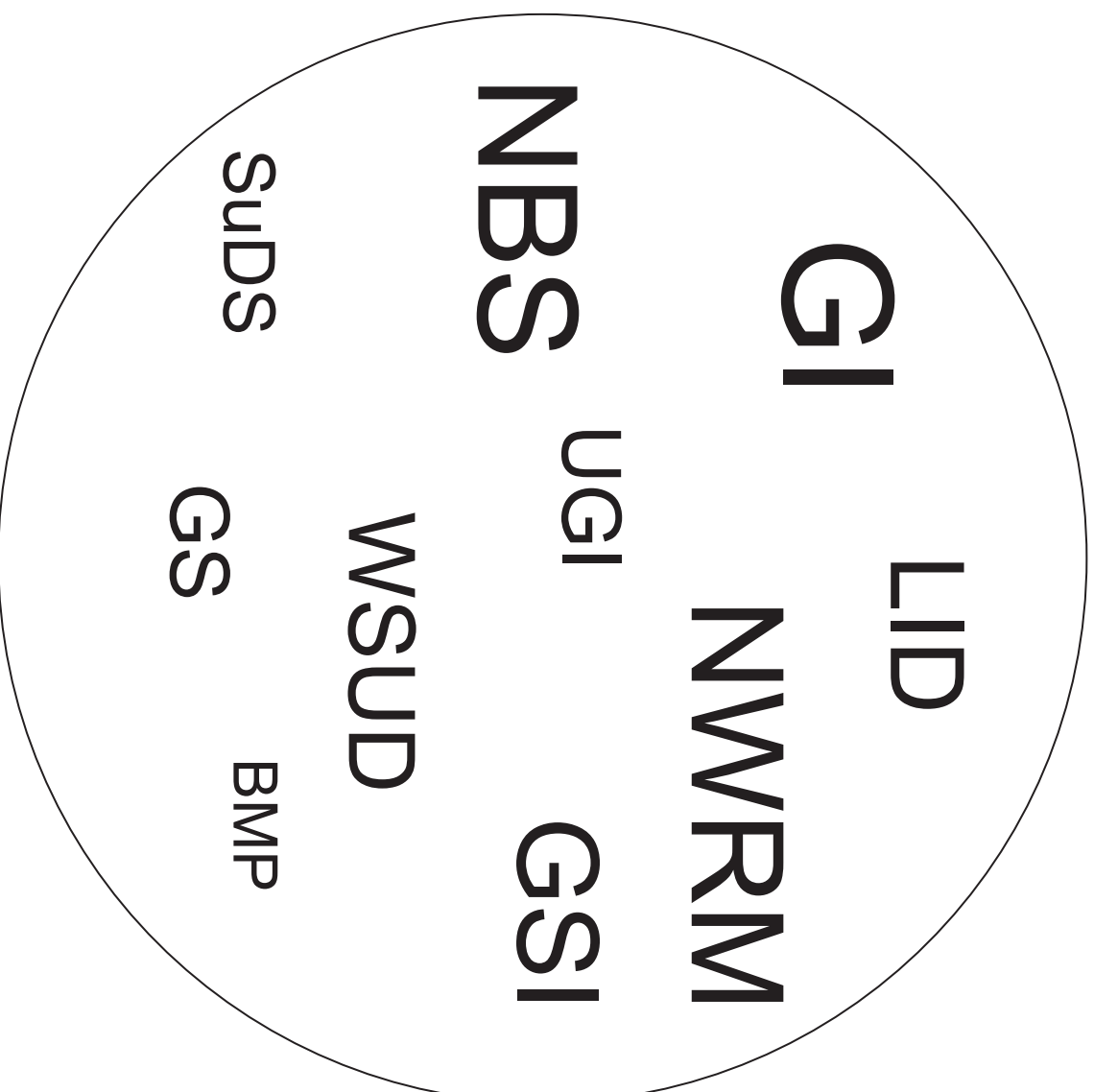
Introduzione

Il ruolo del verde urbano
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UNIVERSITÀ DEGLI STUDI DI MILANO

Dipartimento di Scienze Agrarie e Ambientali



Introduzione

- Green infrastructure (GI)
- Nature-Based Solutions (NBS)
- Low Impact development (LID)
- Natural Water Retention Measures (NWRM)
- Water-Sensitive Urban Design (WSUD)
- Best management Practices (BMP)
- Sustainable Drainage Systems (SuDS)
- Urban Green Infrastructure (UGI)
- Green Stormwater Infrastructure (GSI)
- Green Street (GS)

.....



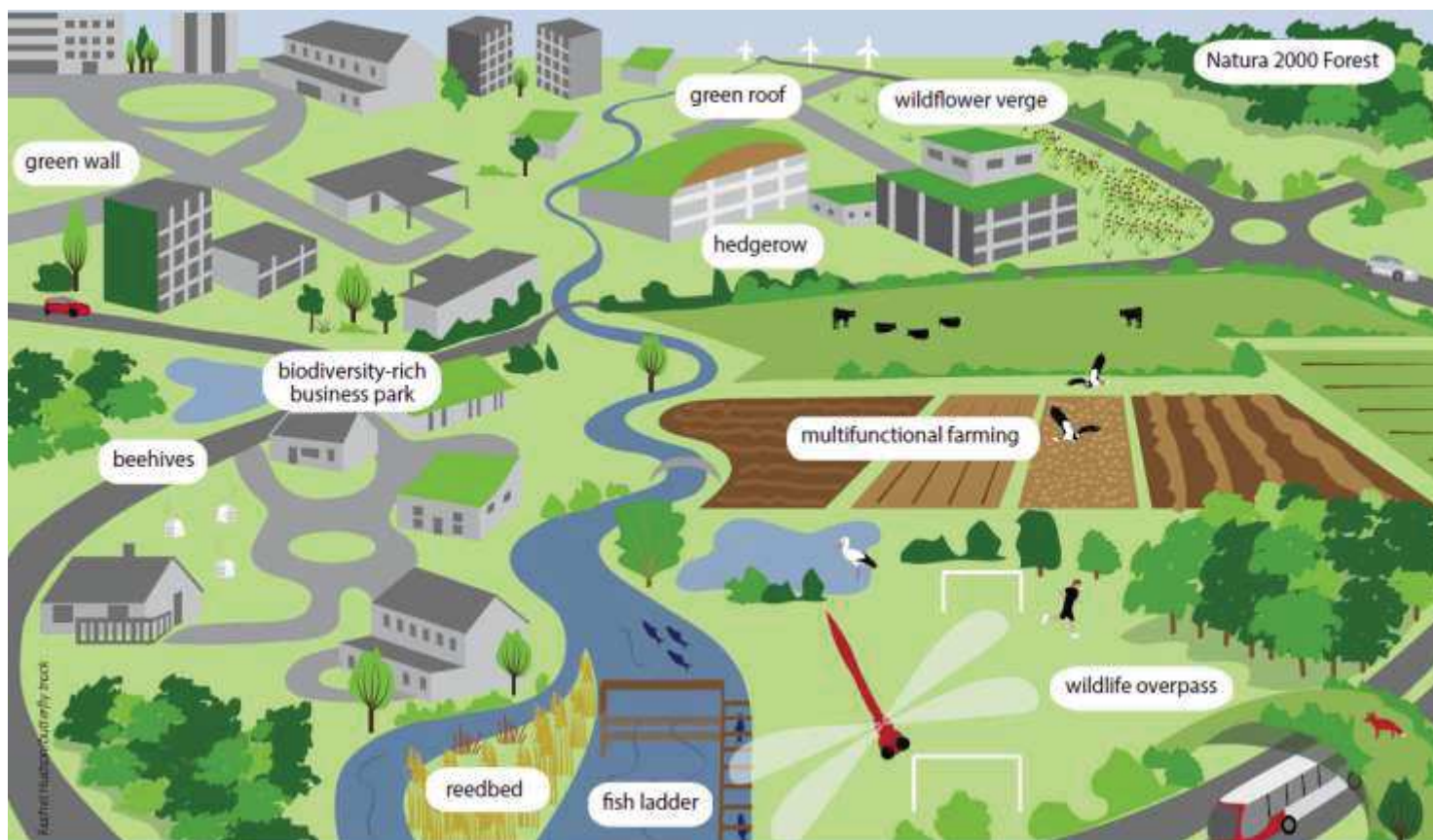


Green Infrastructure

Una rete di **aree naturali e seminaturali pianificata a livello strategico** con altri elementi ambientali, **progettata e gestita** in maniera da fornire un ampio **spettro di servizi ecosistemici**.

Ne fanno parte gli **spazi verdi** (o blu, nel caso degli ecosistemi acquatici) e altri elementi fisici. Sulla terraferma, le infrastrutture verdi sono presenti in un **contesto rurale e urbano**.

(Commissione Europea, 2013)





Green Infrastructure

Le infrastrutture verdi sono uno **strumento** di comprovata efficacia per ottenere **benefici ecologici, economici e sociali** ricorrendo a **soluzioni “naturali”**.

Rispetto alle infrastrutture tradizionali (dette anche **infrastrutture grigie**), concepite con un unico scopo, le **infrastrutture verdi presentano molteplici vantaggi**. A volte può rappresentare un'alternativa o una componente complementare rispetto alle tradizionali soluzioni “grigie”.

(Commissione Europea, 2013)



Green Infrastructure

Table 1: Green Infrastructure Benefits by Type

Benefit	Type
Environmental	<ul style="list-style-type: none"> • Increase carbon sequestration • Improve air quality • Additional recreational space • Efficient land use • Improve human health
	<ul style="list-style-type: none"> • Flood protection
	<ul style="list-style-type: none"> • Drinking water source protection
	<ul style="list-style-type: none"> • Replenish groundwater
	<ul style="list-style-type: none"> • Improve watershed health
	<ul style="list-style-type: none"> • Protect or restore wildlife habitat
	<ul style="list-style-type: none"> • Reduce sewer overflow events
	<ul style="list-style-type: none"> • Restore impaired waters
	<ul style="list-style-type: none"> • Meet regulatory requirements for receiving waters
	<ul style="list-style-type: none"> • Reduce hard infrastructure construction costs
Economic	<ul style="list-style-type: none"> • Maintain aging infrastructure • Increase land values • Encourage economic development • Reduce energy consumption and costs • Increase life cycle cost savings
	<ul style="list-style-type: none"> • Establish urban greenways • Provide pedestrian and bicycle access
	<ul style="list-style-type: none"> • Create attractive streetscapes and rooftops that enhance livability and urban green space
	<ul style="list-style-type: none"> • Educate the public about their role in stormwater management
	<ul style="list-style-type: none"> • Urban heat island mitigation
Social	



GREEN INFRASTRUCTURE CASE STUDIES:

Municipal Policies for Managing Stormwater with Green Infrastructure.



Green Infrastructure

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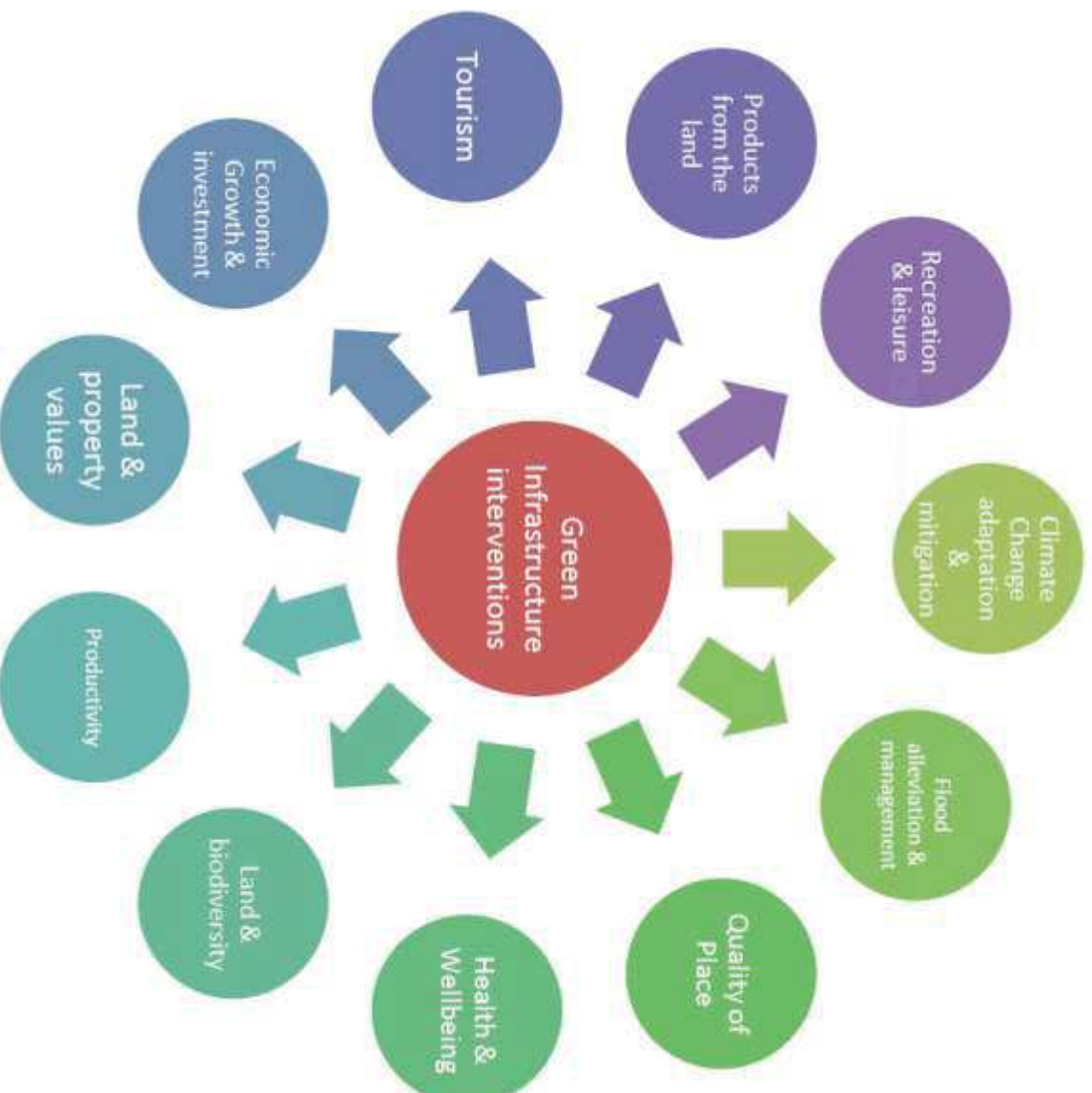
Benefits provided by Green Infrastructure

- Environmental benefits**
 - Provision of clean water
 - Removal of pollutants from air and water
 - Pollination enhancement
 - Protection against soil erosion
 - Rainwater retention
 - Increased pest control
 - Improvement of land quality
 - Mitigation of land take and soil sealing
- Social benefits**
 - Better health and human well-being
 - Creation of jobs
 - Diversification of local economy
 - More attractive, greener cities
 - Higher property values and local distinctiveness
 - More integrated transport and energy solutions
 - Enhanced tourism and recreation opportunities
- Climate change adaptation and mitigation benefits**
 - Flood alleviation
 - Strengthening ecosystems resilience
 - Carbon storage and sequestration
 - Mitigation of urban heat island effects
 - Disaster prevention (e.g. storms, forest fires, landslides)
- Biodiversity benefits**
 - Improved habitats for wildlife
 - Ecological corridors
 - Landscape permeability



Green Infrastructure

Multi-scopo
Multi-funzione
“Multi-benefici”



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Green Infrastructure

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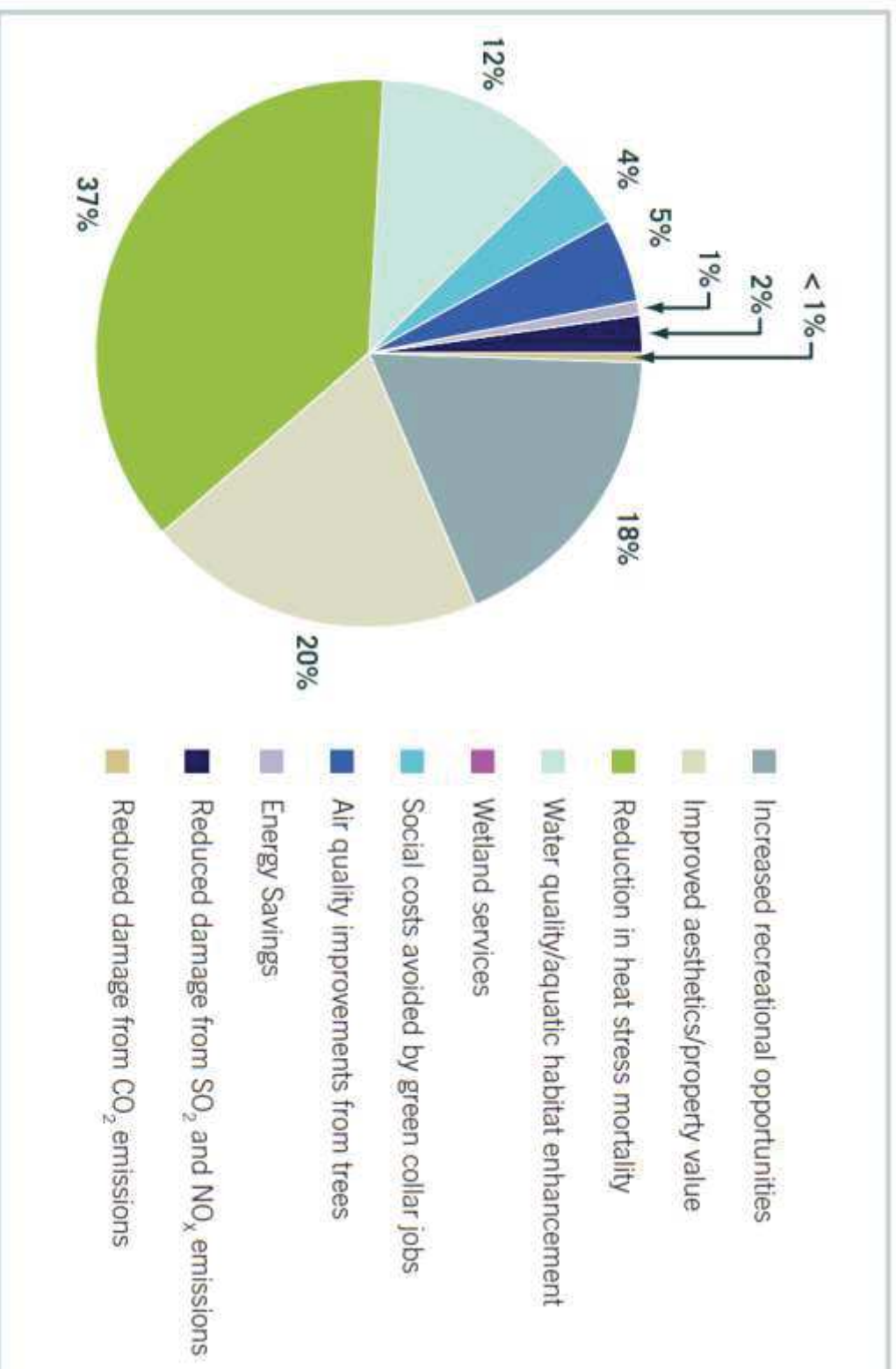
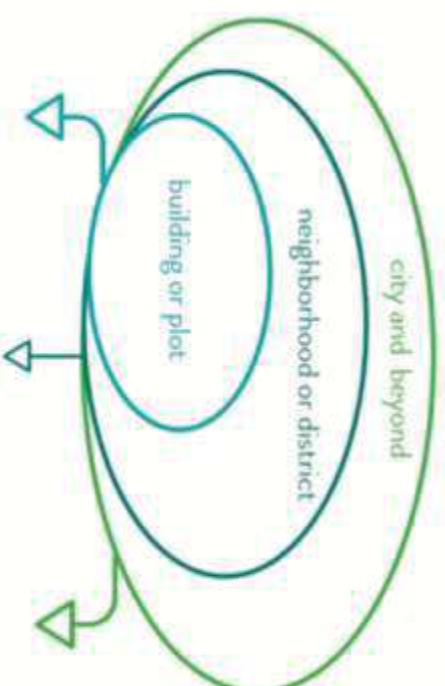


Figure 15: Citywide net benefits for green infrastructure options. Courtesy of Philadelphia Water Department. http://www.phillywatersheds.org/lc/pcu/No102_TBL.pdf

Green Infrastructure



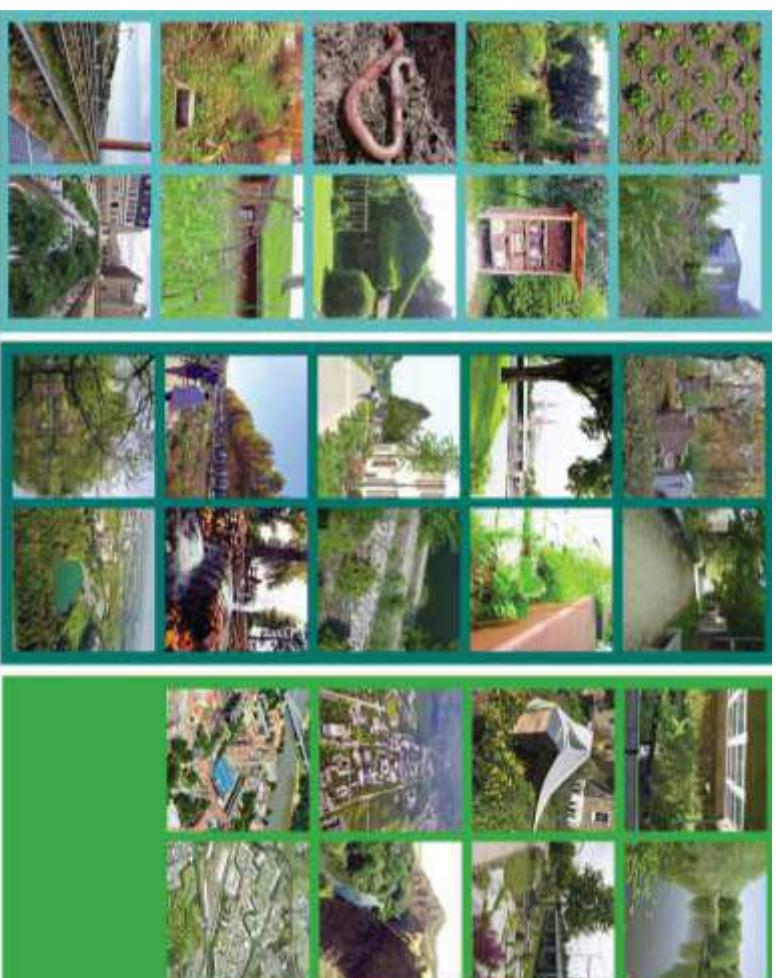
Multi-scopo
Multi-funzione
“Multi-benefici”
Multi-scala

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Green Infrastructure

TYPES OF LOCAL INCENTIVES FOR GREEN INFRASTRUCTURE

- **Fee Discount:** Requires a stormwater fee that is based on impervious surface area. If property owners can reduce need for service by reducing impervious area, the municipality reduces the fee.
- **Development Incentives:** Offered to developers during the process of applying for development permits. Includes zoning upgrades, expedited permitting, reduced stormwater requirements, etc.
- **Rebates & Installation Financing:** Gives funding, tax credits or reimbursements to property owners who install specific practices. Often focused on practices needed in certain areas or neighborhoods.
- **Awards & Recognition Programs:** Provides marketing opportunities and public outreach for exemplary projects. May include monetary awards.

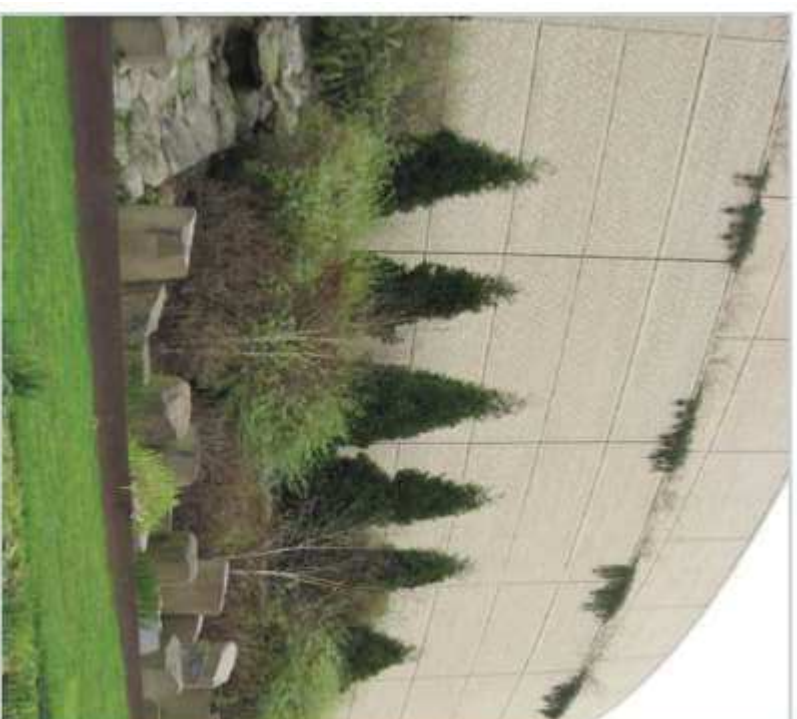


Figure 12: Oregon Convention Center saves \$15,600 per year on its stormwater bill by managing roof runoff in these rain gardens.

Green Infrastructure

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1

Local authorities

Turn strategic GI thinking into reality

Ensure that GI is a core requirement in local authority documents, such as Local Plans, Infrastructure Development Plans and development briefs. Proper consideration should also be given to the potential for multifunctional GI to perform some of the roles that 'grey' infrastructure is used for, particularly water management and waste. Why? Not only does GI tend to be cheaper, but it also provides infrastructure that is resilient to an increasingly unpredictable climate.

2

Local authorities and Business Improvement Districts

Promote collaboration on GI across boundaries

By its nature, GI often crosses administrative and operational boundaries, so it should be addressed through the Duty to Cooperate between local authorities. It should also be part of the remit of business improvement districts and Local Enterprise Partnerships.

3

Developers

New developments should make a contribution to GI

Developers should be aware of an area's strategic GI goals and appreciate their role both in mitigating the environmental impacts of new development and in creating beautiful places. Even small interventions contribute to the overall success of GI, so developers should engage with local communities.

4

Clients

Champion GI that is planned, designed and managed effectively

Successful GI is part of a shared vision – one that appreciates landscape character, sense of place and functionality. Make sure that strategies clearly articulate the vision, priorities, responsibilities and actions needed to plan, deliver and manage GI projects, from the start. Public and private sector landowners and managers should be involved in the planning and design of GI, as their buy-in and expertise is vital to its long-term success.

5

Landowners

Ensure GI is well-funded for ongoing management and maintenance

Management and maintenance are critical if GI is to continue to deliver long-term benefits. By thinking creatively about how to generate capital and revenue, multifunctional land can be funded from several sources. These could include direct income from renewable energy, food production or events, or indirect savings by reducing flood risk and cutting the cost of cooling in urban areas during hot weather.

6

Landscape professionals

Raise awareness of how GI can deliver multiple benefits simultaneously, from boosting the bottom line to mitigating the effects of climate change

Landscape professionals need to appreciate what drives their clients. They advise clients, colleagues and decision-makers about the value of GI, from country parks and community woodlands, to development-specific interventions such as green roofs and sustainable drainage systems. The range of benefits that GI can deliver needs to be communicated to them in a way that resonates with their own objectives.