

Università di Firenze - Dipartimento di Architettura
Laboratorio iCAD
Modulo Urban Landscape Design

Urban Landscape Design

themes

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Pocket Park

The Garden in Motion

Guerrilla Gardening

Urban Farming

Rain Gardens **Vertical garden**

Roof garden

Urban forest

pocket park

A **pocket park** (also known as a *parkette*, *mini-park*, *vest-pocket park* or *vesty park*) is a **small park, accessible to the public.**

Pocket parks are frequently created on **a single vacant building lot** or on small, irregular pieces of land. They also may be created as a component of the public space requirement of large building projects.

We use to place the birth of the term *pocket park* to **New York of the Sixties**, where some movements were experimenting alternative ways of life in the urban context and practices of integration between social classes, ethnic groups, races. In particular, the first attempts to create **community gardens** were started in 1964 in the heart of Harlem

The Pocket Park can be carried **on public or private land.** They are too **small** in order to perform physical activities, but provide a great **place for a stop.**



Balfour street pocket park located on the junction between Chippendale and Broadway – Sidney 2010 Arch. Jane Irvin



Museum of Modern Art Sculpture Garden (MOMA) – New York 1953/restored 2004

pocket park

Highly urbanized areas, particularly in city centers where the land value is the maximum, these **pocket parks**, **seen as a system, are an alternative to the creation of open public spaces of vast dimensions.**

The winning of the small urban gardens is that **their creation does not imply the need for large-scale redevelopment plans.** On the contrary can be made by taking as a basis the existing framework and **may arise on the basis of the initiative of multiple stakeholders:** residents associations, activist groups, patrons, governments try to practice this redevelopment soft.

They are spaces for outdoor seating, for breakfast, sometimes with children's play areas. **They are restricted areas** where finding a momentary detachment from the environment, a break from the commitment and the formalities, where experience a social friendship.

BOOK: Whitney North Seymour, *Small Urban Spaces: The Philosophy, Design, Sociology, and Politics of Vest-Pocket Parks and Other Small Urban Open Spaces*, New York University Press, 1969



BRYANT Park, New York 1988

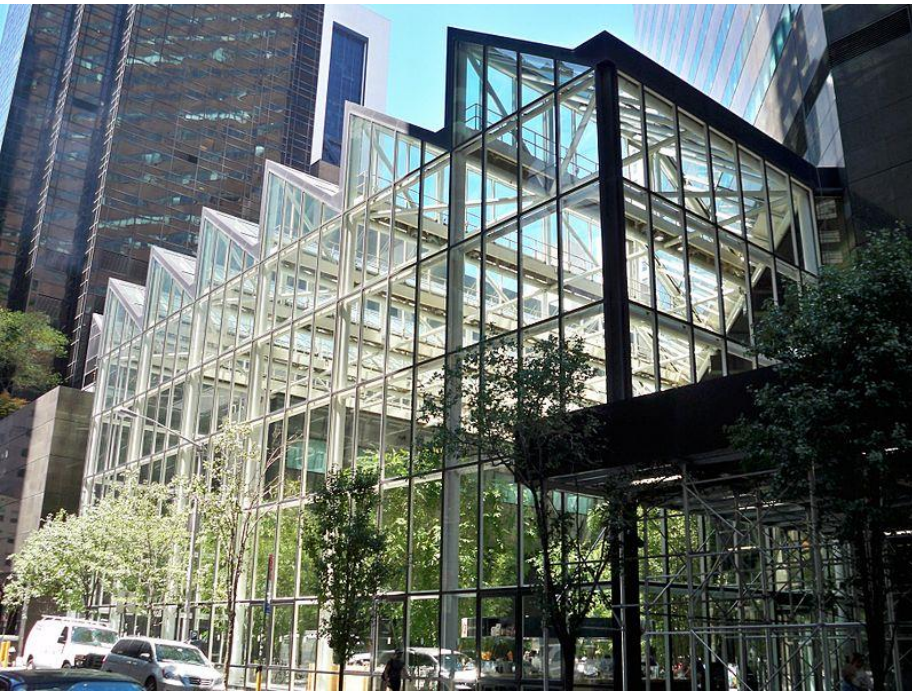
The area, back to the New York Public Library, is public, but it is managed by a no-profit organization

pocket park

Bamboo garden (IBM Building) New York 1984



the **IBM Building** is a tall skyscraper (184 m - 41 floors) at the corner of 57th street and Madison Avenue. Madison Avenue is in the Midtown section of Manhattan which is dense with many office buildings. The location of the IBM building is close to 2 other significant skyscrapers that also have public open spaces (the *Trump Tower* and the *Sony Building*). This context strongly influenced the design of the building. **The cutting of the South West corner of the building allowed the creation of open space at ground level.** The open space is connected to 5th Avenue through the atrium in the Trump Tower. Also, a pedestrian arcade is across the block and creates circulation from 57th Street through 56th Street to the Sony Building.



The **garden is inside a greenhouse** that serves as an atrium, it is emerging as **paved square covered by a glass structure**. From the pavement get out **11 groups of bamboo**, high about 15 m, that shade the space. Under the plants, chairs and garden tables are placed. The space hosts art exhibitions. The **property is private**.

pocket park



Paley Park

opened in 1967 in the center of Manhattan in Midtown bristling skyscrapers that houses the offices of large companies.

A seemingly high-sounding name, given to an open space of even **400 square meters**.

It is an extraordinary **green courtyard**, enclosed **on one side by a fountain-waterfall**, that covers the traffic noise.

The rectangular area is closed on three sides and open on the road with a gate. The lateral brick walls are covered with ivy.



A pocket-sized garden which is an oasis introverted, **a cozy living room** that helps discover and make sense of leisure in the midst of the metropolis.

The **property is private**

Garden in Motion



Gilles Clément (France, 1943) is a writer, entomologist, **gardener**, landscape architect and engineer agronomist

In the early 1970s, **Gilles Clément** began to design and create gardens for private clients in France and abroad. In 1977, he took a break from this activity to devote his time to “public areas”, founding the Atelier Acanthe in 1985. He set up his own business as an artist in 2000 and organised his production via sub-contracting contracts with landscaping workshops, Coloco in Paris in particular.

He acted as lecturer at the ENSP – National School of Landscape Architecture in Versailles from 1980 to 2012, gave lectures at the Collège de France within the context of the artistic creation chair and continued as a temporary lecturer during workshops in Italy, Spain and France.

His work has been rewarded with a number of prizes including the “Grand prix du paysage” in 1998.

The concept of the “Jardin en Mouvement” (**garden in motion**), born from an experiment in his own garden in the Creuse area, was applied to a public area for the first time in 1986 at the **Parc André Citroën**.

The eponymous publication was completed in 1991.

Several others followed (more than 20), some of them conveying other important concepts: the “Jardin Planétaire” (**planetary garden**) exhibition in La Villette in 1999/2000, the “Tiers-Paysage” (**third landscape**) in 2003, translated into several languages.

[*Belvédère : points de vue sur le paysage*](#), Tarabuste, 2013

[*Une brève histoire du jardin*](#), Jean-Claude Béhar Editions, 2011

[*Neuf jardins : approche du jardin planétaire*](#), Actes Sud, 2008

[*Le jardin en mouvement : de la vallée au champ via le parc André-Citroën et le jardin planétaire*](#), Sens & Tonka, 2007

Quodlibet
Gilles Clément
Il giardino in movimento



Le jardin en mouvement, 1994



The Parc André Citroën (co-design), the Domaine du Rayol in Var, the Jardins de l'Arche in Nanterre, the Jardin de Valloires in Somme, the Parc Matisse in Lille, the Quai Branly museum gardens in Paris, the roof of the submarine base in Saint Nazaire (Jardin du Tiers-Paysage) are among his most widely-known projects



**Parc André Citroën, Paris,
France, 1986 – 1992**
Gilles Clement



The source of inspiration for the « **Garden in Motion** » is **neglected land**: a parcel of land left (*friche* in French).

On such pieces of land , the **existing sources of energy** - growth, struggle, shifting, exchange - **do not encounter the obstacles** usually set up to oblige nature to yield to geometry, to tidiness, or any other cultural principlesl.

As with all species that sustain life - plants, animals, humans - **the Garden in Motion is subject to the evolutionary process resulting from long term interaction.**

Which balance between shadow and light, which adjustment among the species present, with, as an objective, to maintain and increase biological diversity, a source of wonder, a guarantee for the future.

the Garden in Motion recommends **maintaining those species that decide where they wish to grow.**

These gardens **look wild, but they are carefully constructed**, claiming the **leadership of the plant biological dynamics**, related to the **principle of biodiversity and conservation of species**

Parc Citroen Paris



Garden in Motion is Clément's belief in combining the energy (**movement**) of a place with his design visions, **creating a fluid interplay between moving organic matter and static constructions.**

Clément states *'In practice, the gardeners of these landscapes must actively maintain movement, aiding nature rather than enacting rigid plans.'*

It may appear obvious that a garden of plants will in fact 'grow' and a gardener would need to consider that growth would need to be accounted for when designing a garden.

Clément's design approach exerts a depth consideration for biology and the complexity, characteristics, spatial demands and nourishment needs of the plants already existing or to be introduced into the gardens. **This is not a plan in order to dictate a final result or image of the garden but rather as a complementary structure in order to 'systematically maintain the garden's growth.**





Herbaceous plants
grasses

“nature” it is not subdued and suffocated by the bridles of a project

“tramp plants”

“The plants travel. Herbs, mostly. They are moving in silence, as the winds. We can do nothing against the wind. If you harvest the clouds, you would be surprised to gather unpredictable seeds mixed with fertile dust. Already in the sky, they can draw unimaginable landscapes.”

“The third Landscape”

Le Tiers paysage 2005

Clément uses the term **to classify wastelands** such as former industrial areas or nature reserves that are prime **locations for accumulating bio-diversity**. It designates the sum of the space left over by man to landscape evolution - to nature alone. Included in this category are left behind (*délaissé*) urban or rural sites, transitional spaces, neglected land (*friches*), swamps, moors, peat bogs, but also roadsides, shores, railroad embankments, etc.

The **Third Landscape** is an undetermined fragment of the **Planetary Garden**

The Third Landscape **is of interest to the planning professionals**, the designer, led to include in his project an unorganized space or to designate as public amenity unattended areas created, voluntarily or not, by all land use.

These landscapes are **places of indecision** where we can witness the relationship between the city and spontaneous biodiversity, bringing an ecological value to these otherwise neglected and discarded areas.



Dichiarata nel 2010 Patrimonio del XX secolo dal Ministère de la Culture et de la Communication francese, un'imponente archeologia post-bellica vicino a Nantes ospita sul suo tetto una trilogia del Terzo Paesaggio. Realizzata da Gilles Clément, con la collaborazione di atelier Coloco.

Declared Heritage of the XX century by the French Ministère de la Culture et de la Communication, an impressive post-war archeological building hosts on its roof a trilogy of the Third Landscape, near Nantes. A garden created by Gilles Clément with the collaboration of atelier Coloco.



Spazi di resistenza e giardinieri planetari Spaces of resistance and planetary gardeners

The Third Landscape Garden, Saint-Nazaire, France

Anna Lambertini

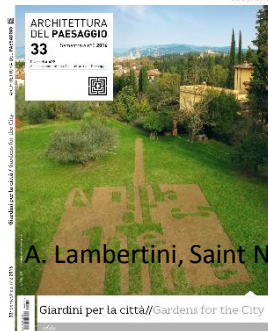
L'ex base sottomarina di Saint-Nazaire, nei pressi dell'estuario della Loira, è un'imponente architettura in cemento armato costruita dai nazisti, durante la Seconda Guerra mondiale, come parte del sistema costiero di difesa tedesco denominato Muro Atlantico.

The former submarine base of Saint-Nazaire near the Loire estuary is a hulking reinforced concrete structure built by Nazi army, that was part of the coastal defense system named Atlantic Wall. After decades of abandon and many debates about its destiny, in 1998 the municipality decided to recover the base, as part of the Ville-Port project conceived by the Spanish planner Manuel de Solà-Morales. To promote a new collective perception and new uses for the huge structure were constructed the Escalme de l'Escale Atlantique, inside one part of the bunker, both than a new ramp to access the top of the building. The roof was opened to public use and reinvented as unconventional panoramic terrace.

Decenni di abbandono e di dibattiti sul suo destino, nel 1998 l'attuazione del progetto Ville-Port Manuel de Solà-Morales elude la possibilità di un'ingombrante archeologia post-bellica, e il processo di riconversione. Le prime opere recuperano hanno riguardato la realizzazione di un'area de l'Escale Atlantique, all'interno di un bunker, e la costruzione di una rampa al tetto che, aperto al pubblico, è stato reinventato come terrazza panoramica.

In occasione della Biennale d'art contemporain Estuaire (now La voyage à Nantes) Gilles Clément, ha realizzato un intervento, individua il tetto

In 2009 during the Biennial d'art contemporain Estuaire (now La voyage à Nantes) Gilles Clément, who had been invited to create a permanent artwork.



A. Lambertini, Saint Nazaire (Francia), *Giardini per la città* n.33/2016, pag. 66-67

Giardini per la città//Gardens for the City

the roof of the former submarine base is now an open terrace between the city and the harbour basin. Clément views the submarine base as “a **place of resistance**” that can accommodate the ecological diversity of the estuary and he set out to develop the site over a 3-year period 2009-2012. In 2009, **107 aspens were planted in the former explosion chambers** at the base, so when fully grown they would appear to make the base tremble and shimmer which was Clément’s first poetic intention.

“Le Bois des Trembles” (The Garden of Aspens), *“Le Jardin des Orpins et des Graminées”* (The Garden of Stonecrops and Horsetails) et *“Le Jardin des Étiquettes”* (The Garden of Labels) form a triptych (3 gardens) for the work *Le Jardin du Tiers Paysage*



Gilles Clément-Atelier Coloco, Saint Nazaire, 2010

Jardin des Étiquettes



ÉCHELLE DE CONSTRUCTION DE 100 CM SUR
LE PLAN. LES BACS ET PLANTS DE 20 CM.



In *The Garden of Labels*, the former submarine pit, Clément added a **thin layer of bedrock** onto which the **wind, birds, and the soles of visitors shoes will deposit seeds** as they pass through.

The proposal with this project, as with all the projects commissioned for Estuaire is for a **continual and ongoing maintenance programme** which embeds the work further in the local landscape. **Twice a year, new plants will be identified planted and labelled.**



“The Planetary Garden”

Le jardin planétaire, 1999

“Together, let us assume that the Earth is one small garden”

Clément calls for better understanding before intervention, for observation before action, for doing with rather than against nature.

The Planetary Garden is a concept which views as a solidly entwined knot

- the diversity of human beings on the planet
- the role of man in managing this diversity

The concept of the Planetary Garden emerges from a triple observation:

- ecological finality
- planetary stirring as an initial sign of activity, movement, or emotion
- human engagement

Viewing the garden in the context of planet earth, presenting belief in bio-diversity that extends beyond the individual garden to encompass the earth’s ecosystem as a whole.

*‘The **gardener (man) becomes a worker for nature**, again balancing actions of activity and passivity, creating harmony even in dissonance’.*



Guerrilla gardening

The term “guerrilla” may bring to mind a small band of armed soldiers, moving in the night on a stealth mission.

In the case of guerrilla gardening, **the soldiers are planters, the weapons are shovels, and the mission is to transform an abandoned lot into a thing of beauty.**

The earliest recorded use of the term ***guerrilla gardening*** was by Liz Christy and her Green Guerrilla group in 1973 in the Bowery Houston area of **New York**. **They transformed a derelict private lot into a garden.**

Now Guerrilla gardening takes place in many parts of the world

<http://www.guerrillagardening.it/>

Guerrilla gardening **is the act of gardening on land that the gardeners do not have the legal rights to utilize**, such as an abandoned site, an area that is not being cared for, or private property. That land is used by guerrilla gardeners to raise plants, frequently focusing on food crops or plants intended for aesthetic purposes.

Some guerrilla gardeners **carry out their actions at night**, in relative secrecy, to sow and tend a new vegetable patch or flower garden in an effort to make the area of use and/or more attractive.

Some gardeners act at more visible hours for the purpose of publicity, which **can be seen as a form of activism.**

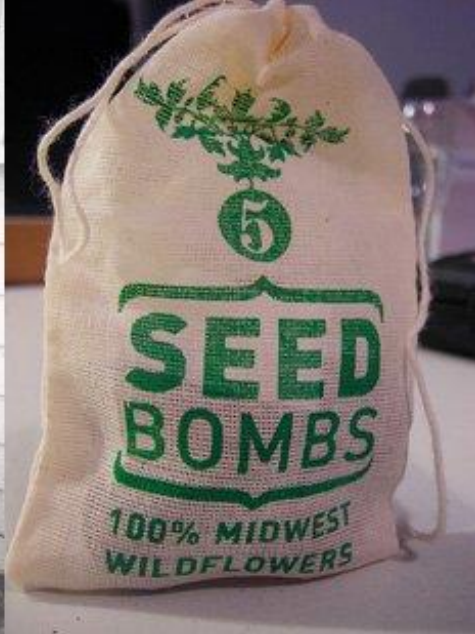




CHILD ABUSE
PREVENTION
CENTRE
ORG

Guerrilla gardening

Seed bombing



Greenaid is a Los Angeles based organization founded in 2010. The organization **converts vintage gumball machines to dispense seed balls**. Once dispensed, seed balls are tossed or planted in any area that may benefit from wildflowers (**Seed bombing**)



Sometimes exasperation leads to extreme actions: so extreme that they often become a means, albeit ironic, **to denounce everyday problems.**

to signal the dangerous road pits that now characterize many streets, some residents have decided to plant inside the flowers and publish some shots on the social network

Parking to parklets

http://www.aucklanddesignmanual.co.nz/resources/case-studies/street_parklets_san_francisco

Parklets are very small parks or mini-plazas that are constructed in on-street car parks. San Francisco's parklets programme provides inspiration for how we may use parking spaces to drive better community, environmental and economic outcomes in our neighbourhoods.

Parklets are often constructed either where urban park areas are lacking or where footpaths are too narrow to provide adequate space. Parklets can radically improve a street environment by reclaiming parts of the street for pedestrians and bringing vibrancy to the immediate area. This Case Study looks at examples of excellent parklets in the city of San Francisco.

urban farming



Urban and peri-urban agriculture (UPA)

can be defined as **the growing of plants and the raising of animals within and around cities**

Urban and peri-urban agriculture play an important role in **making food more affordable** and in **providing emergency supplies of food**

There are many **social benefits** that have emerged from urban agricultural practices, such as **improved overall social and emotional well-being, improved health and nutrition**, increased income, employment, food security within the household, and **community social life**.

<http://www.fao.org/>

Food and Agriculture Organization of United Nations

An intergovernmental organization, 194 Member Nations

urban farming



small urban farm in Amsterdam



Rooftop urban farming at the Food Roof Farm in downtown St. Louis, MO

Urban farming is the practice of cultivating, processing, and distributing food in or around a village, town, or city.

Urban agriculture can reflect varying levels of economic and social development.

It often takes the form of a **social movement for sustainable communities**, where organic growers form social networks founded on a shared ethos of nature and community holism.

Modern planning and design initiatives are often more responsive to this model of urban agriculture because it fits within the current scope of **sustainable design**.

community garden

is a single piece of land gardened collectively by a group of people

shared gardens

Garden sharing arrangements take two main forms. The simplest is an agreement between two parties: one supplies the land, the other supplies the labour

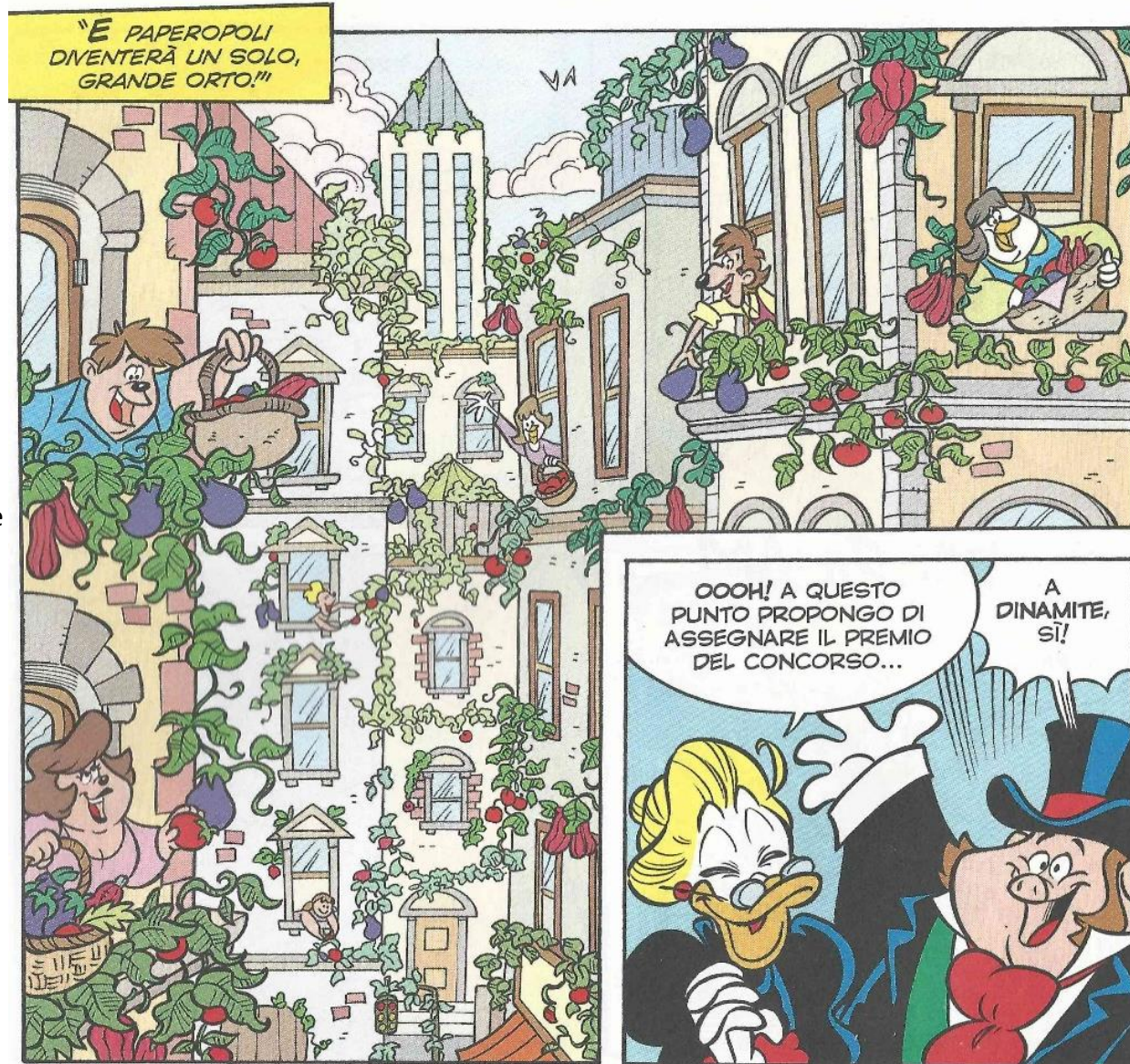
edible gardens

Edible Garden City is a movement set in Singapore
<http://www.ediblegardencity.com/about/>

vegetable garden

is a garden that exists to grow vegetables and other plants useful for human consumption, in contrast to a flower garden that exists for aesthetic purposes

The traditional **kitchen garden** is a space separate from the rest of the residential garden with ornamental plants. Most vegetable gardens are still miniature versions of old family farm plots



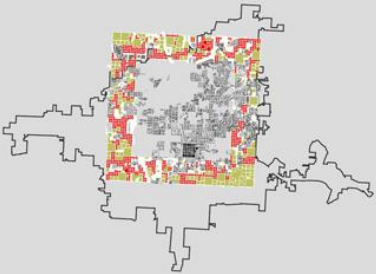
Topolino (the Italian name for Mickey Mouse) the Italian Digest-sized comic series featuring Disney comics

urban farming

Food City Project, Fayetteville, North Carolina, United States of America

Designers: University of Arkansas Community Design Center (UACDC) originated in 1995, directed by Stephen Luoni

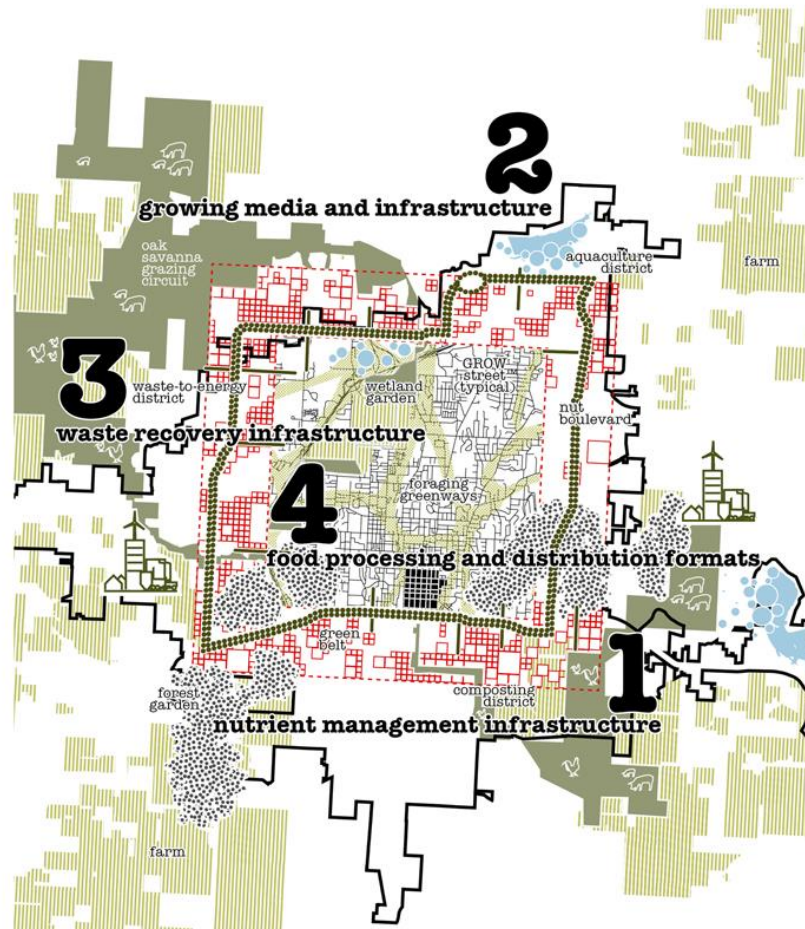
Middle scale urban food production requires **four new types of infrastructure.**



2030 Greenbelt Proposal

Food City establishes a greenbelt that intensifies agricultural systems and urban densities at 15 units per acre along Fayetteville's patchy ring road landscape.

- population 73,580 (projected 140k by 2030)
- college town
- hill town
- 46" annual rainfall
- USDA Hardiness Zone 6b: -5F to 0F



The Plan for Food City proposes a **design method to embed agricultural capacity into settlement patterns**, at different scales.

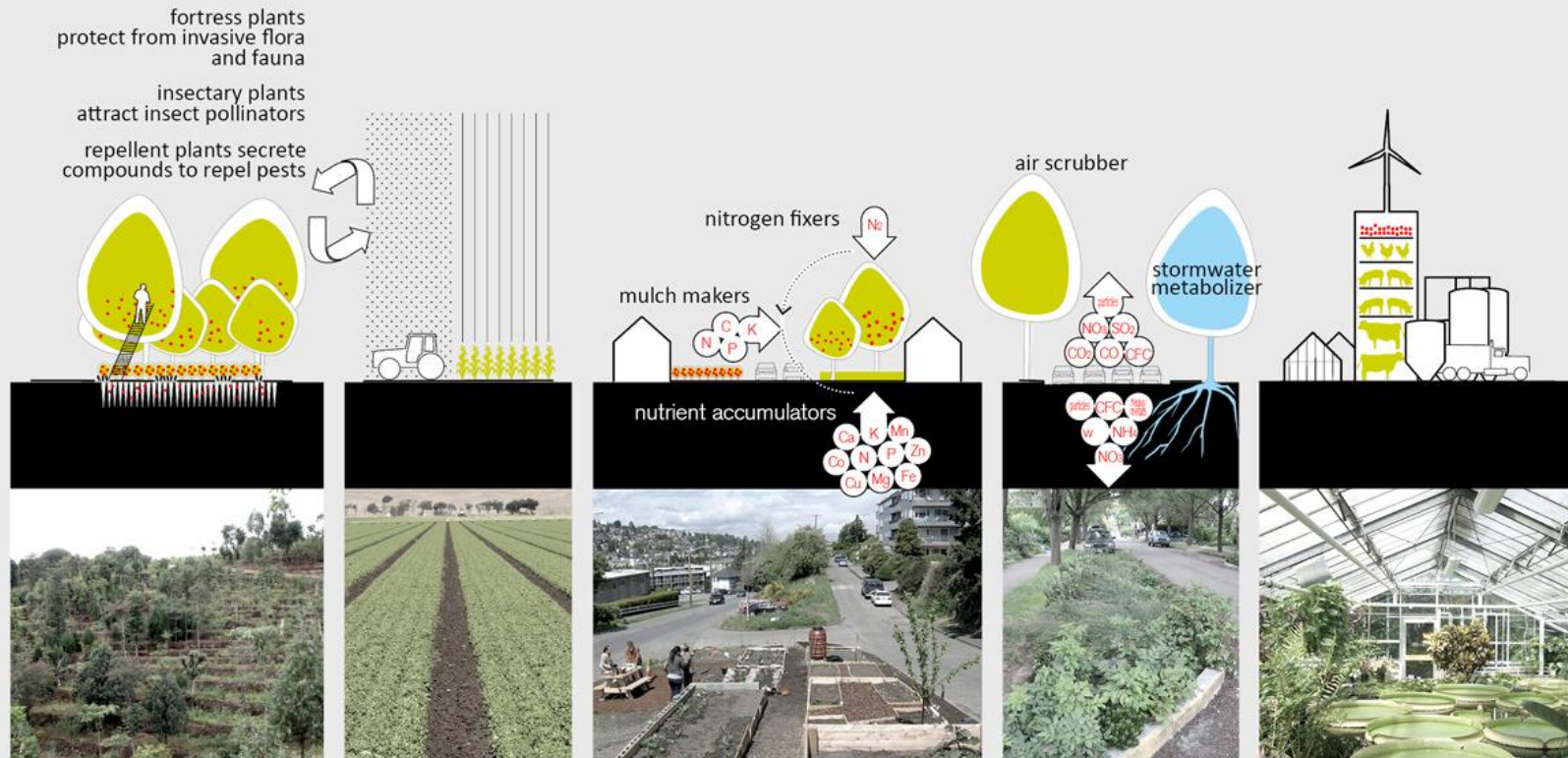
It proposes a **greenbelt and productive urban landscapes that intensify agricultural systems and urban densities**

Food City devises a **model agroecological vocabulary** for reclaiming a missing middle scale of urban agriculture between that of the individual garden and the industrial farm.

Food City formulates an agroecology of **Five Urban Growing Guilds**:

- 1) **permaculture/foraging landscapes**, related to perennial landscapes hosted by existing woodlands;
- 2) **farming and gardening** requiring intensive management of annual landscapes;
- 3) **GROW Streets (Gardened Right-of-Way)** associated with street orchards and edible front yards;
- 4) **pollution remediation landscapes** that support safe urban growing;
- 5) **waste-to-energy districts** that upcycle concentrated agriculture and urban waste streams.

The Five Urban Growing Guilds



permaculture and foraging
 Permaculture and foraging landscapes like edible forest farms are related to successive perennial landscapes and existing woodlands.

farming and gardening
 Farming and gardening requiring management of annual landscapes.

GROW street™
 GROW streets (Gardened Right-of-Way) are associated with public right-of-ways involving orchard-lined streets, fruit and nut boulevards, and edible front yards.

pollution remediation
 Pollution remediation landscapes support safe urban growing primarily through low impact stormwater management and carbon sinks for air pollution.

waste-to-energy
 Waste-to-energy districts recycle concentrated production and consumption waste streams from some operations as energy for others.

application:

Steep slopes and sites with natural tree cover.

Flat land with access to irrigation.

Retrofitting unused green space or existing streets.

Reactive to high-pollutant site runoff.

Retrofitting wastewater treatment plants.

2

GROW street:TM Gardened Right-Of-Way

The desire and ability to produce food is socially transmitted. Gardened Right-Of-Ways privilege food production and other non-traffic functions within the street yet still accommodate vehicular uses.

They privilege food production and other no-traffic functions within the streets



usufruct laws provide the legal right to harvest fruit from private or public property if it overhangs, or is accessible from, public and even semi-public space.



Low Impact Development
pollution remediation plant guild supports GROW street.

urban farming

Rooftop farming is usually done using green roof, **hydroponics** (it is a subset of hydroculture and is a method of growing plants using mineral nutrient solutions, in water, without soil), **aeroponics** or air-dynaponics systems or **container gardens**



Hells Kitchen Farm Project,
Hell's Kitchen,
Manhattan

urban farming

Rooftop Haven for Urban Agriculture

Gary Comer Youth Center, Chicago USA

Hoerr Schaudt landscape architects

ASLA (American Society of Landscape Architects) 2010 professional Awards



The Gary Comer Youth Center Roof Garden is an **after-school learning space for youth and seniors**. Its green roof is a model for **using traditionally underutilized space for urban agriculture** and exceptional in its **balance of an aesthetic vision with practical needs**.

It produces organic food used by students, local restaurants and the center's café.

urban farming

A Vertical Farm Inside and Out

Pasona Tokyo Headquarters, **Tokyo** 2010
KONODESIGNS

It is a 9 story high, corporate office building. The project consists of a double skinned green facade, offices, an auditorium, cafeterias, a rooftop garden and most notably, **urban farming facilities integrated within the building.**

The green space with 200 species including fruits, vegetables and rice that are harvested, prepared and served at the cafeterias within the building.

It is the largest and most direct **farm-to-table of its kind ever realized** inside an office building in Japan.



urban farming

community gardens

Chiasso, Switzerland

arch. Sophie Ambroise - Officina del Paesaggio

Born in 2010 from an idea of **the citizens** on an area of semi-periphery close to a skating rink. It was given to the community by the Swiss Federal Railways.

It is equipped with areas for **dining and relaxing** with gardens and **the raised beds** (hanging gardens), **accessible to people with disabilities** as well as the elderly, young couples and families with children, social backgrounds and nationalities.



It is a cultivable area of 1,000 square meters including 44 batches of 25 x 30 square meters.

urban farming



Because the historical identity of Chiasso is linked since '800 to the transport and international transit of goods, the choice of the designer to use in gardens the **pallet movements (filled with stones and excavated material)** is revealed natural and consistent with the context in which they are placed.

The pallets become excellent **containers for soil cultivation of suspended vegetable gardens**, mark the **boundaries of the parcels** without the need for masonry work and contribute to the construction of **pleasant seating** for people of shared gardens



Pallet=platform on which goods can be moved, stacked, and stored

Roof garden



The roof garden of the Rockefeller Center in Manhattan

The Rooftop Garden on the City Hall of Chicago



roof garden is a garden on the roof of a building.

Besides the **decorative benefit**, roof plantings may provide food, temperature control, hydrological benefits, architectural enhancement, habitats or corridors for wildlife, recreational opportunities, and in large scale it may even have **ecological benefits**.

The practice of cultivating food on the rooftop of buildings is sometimes referred to as **rooftop farming**.



Roof garden

Academy of Sciences

San Francisco 2008

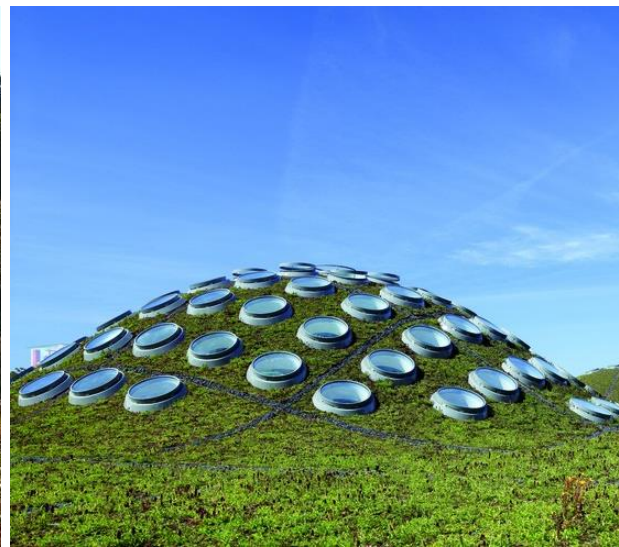
Arch. Renzo Piano

A “**living roof**” covered with 1,700,000 selected **autochthonous plants** planted in specially conceived **biodegradable coconut-fibre containers**.

The roof, like a natural landscape, becomes increasingly undulating as it forms a **series of domes of various sizes** rising up from the roof plane.

The two main domes cover the planetarium and rain forest exhibitions.

The domes are speckled with a pattern of skylights automated to open and close for ventilation.



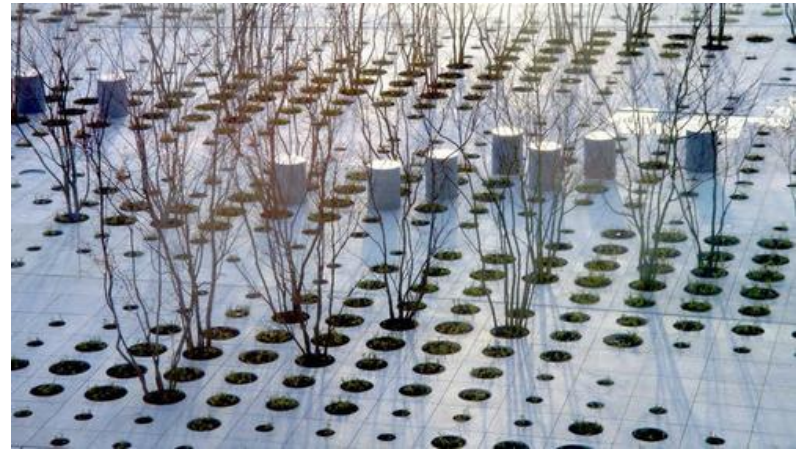
Roof garden

Keio University Roof Garden Tokyo 2012 | Michel Desvigne



On the top floor there's this roof garden done by Michel Desvigne. A little oasis in Tokyo. **Tokyo** is known for its **public program on top of roofs**. You can find parks, sportsfields, bars and so much more on top of the towers and buildings. This little park fits really well in the 3D urbanism of Japan.

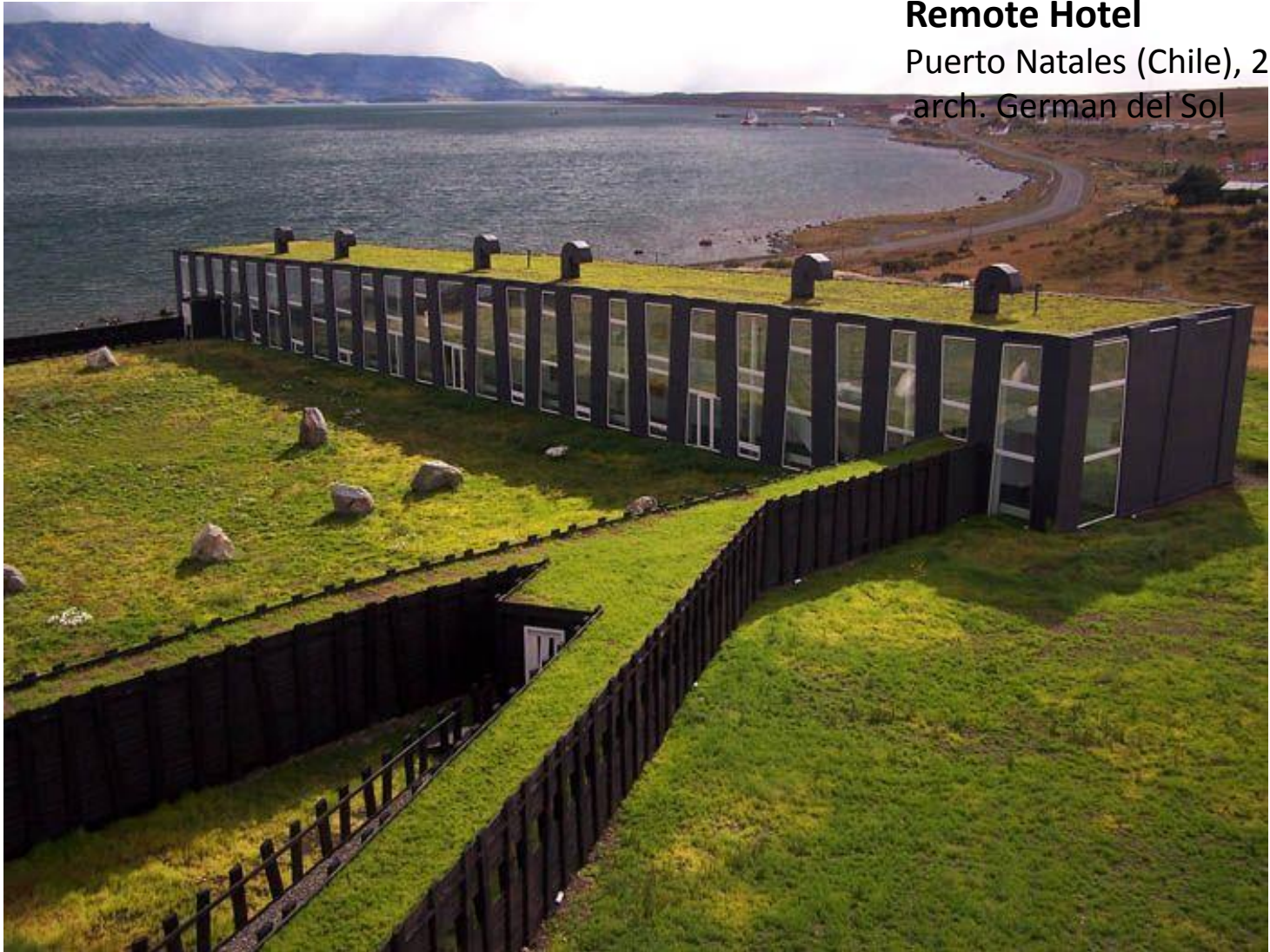
Keio University Roof Garden



Roof garden

Remote Hotel

Puerto Natales (Chile), 2005
arch. German del Sol



The concept of the building regards the reduction of energy consumption. It was privileged the orientation of the volumes in order to promote the passive solar energy collection. The garden roof is built with gravel and grasses.

Roof garden

Library Delft University of Technology
Delft, **Netherlands** 2013
Mecanoo

The building's roof, renovated in 2009, consists of an inclined plane, practicable and destined to outdoor activities and relax. In winter, the roof is used as a ski slope





Madrid is drawing up plans to plant gardens on the rooftop of the city's buses and bus stops (2016)

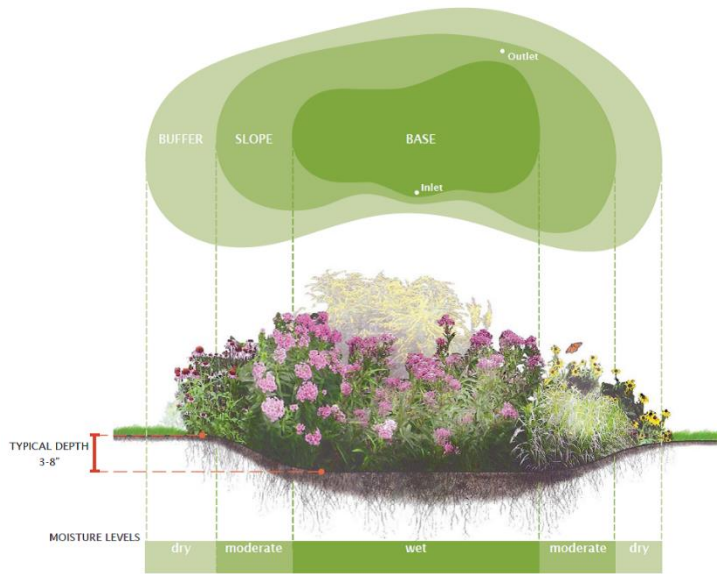
The project, known as “**Muévete en verde**”, is one of six schemes designed to improve the city's environment.



These innovative gardens have been grown by PhytoKinetic and are the latest in a series of **measures introduced by city's administration to boost its environmental policies.**

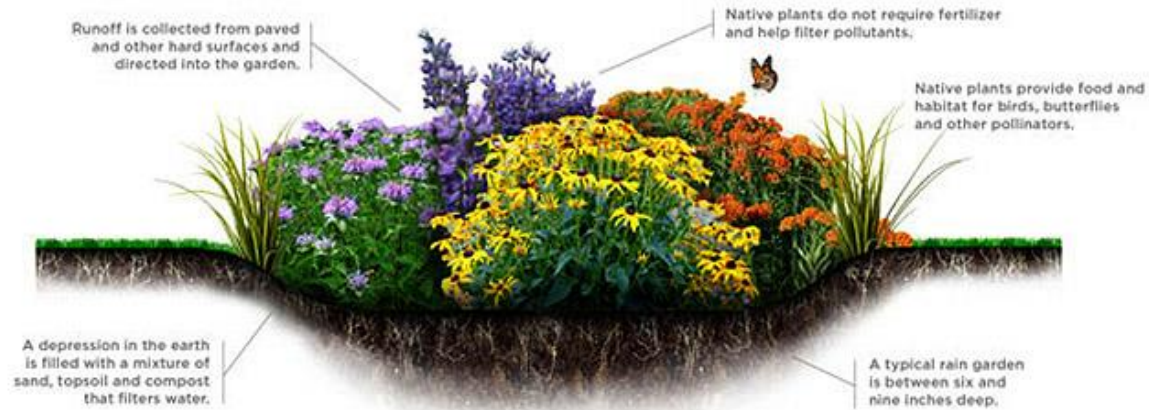
A garden on a bus rooftop will cost 2,500 Euros. Those on the top of bus shelters will be rather cheaper.

Rain gardens



What is a Rain Garden?

Nature's Water Filter: Rain gardens are shallow landscaped depressions that capture, clean and absorb stormwater runoff from roofs, parking lots and roads.



A rain garden is a planted depression or a hole that allows rainwater runoff from impervious urban areas, like roofs, driveways, walkways, parking lots, and compacted lawn areas.

This reduces rain runoff by allowing stormwater to soak into the ground (as opposed to flowing into storm drains and surface waters which causes erosion, water pollution, flooding and diminished groundwater). They should be designed for specific soils and climates.

The purpose of a rain garden is to improve water quality in nearby bodies of water and to ensure that rainwater becomes available for plants as groundwater rather than being sent through stormwater drains straight out to sea.

Rain gardens can cut down on the amount of pollution

Rain gardens

Rain gardens are designed to **capture the initial flow of stormwater** and **reduce the accumulation of toxins flowing directly into natural waterways** through ground filtration.

Rain gardens are beneficial for many reasons:

- **improve water quality** by filtering runoff,
- provide localized **flood control**,
- are **aesthetically pleasing**,
- provide interesting **planting opportunities**,
- encourage **wildlife and biodiversity**
- provides a way to use and optimize any rain that falls, reducing or **avoiding the need for irrigation**



NATURAL SYSTEM BENEFITS

- ✓ Provide Habitat
- ✓ Slowly Release Storm Flow
- ✓ Filter Pollutants
- ✓ Recharge Groundwater
- ✓ Reduce Erosion



Rain gardens

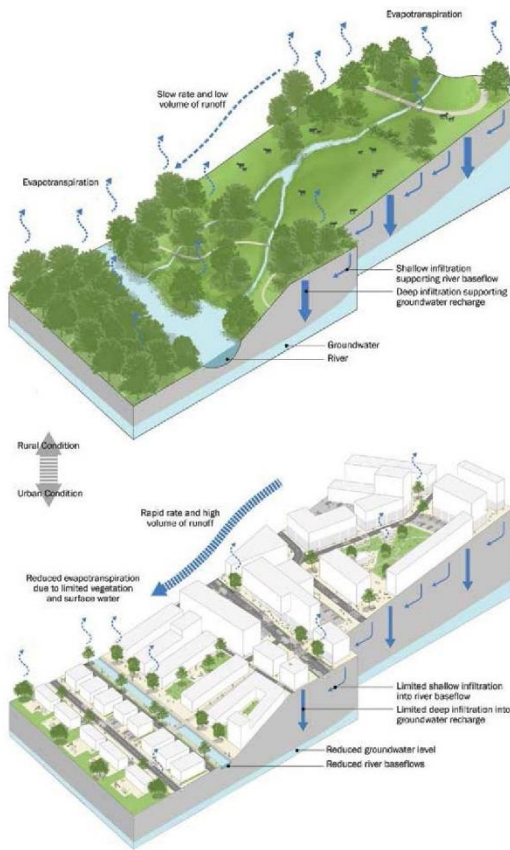


Figure 1.2 Impacts of urbanisation on a catchment

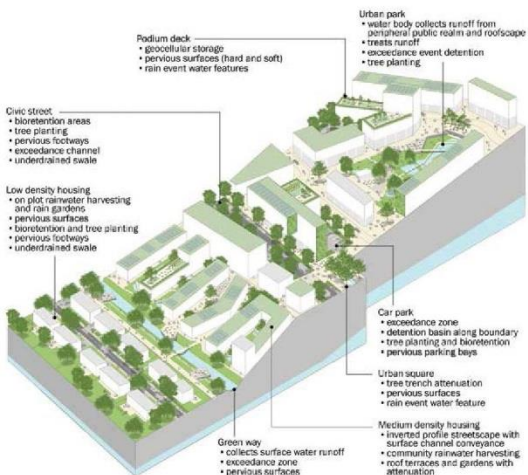


Figure 1.6 Examples of commonly used SuDS for different development types

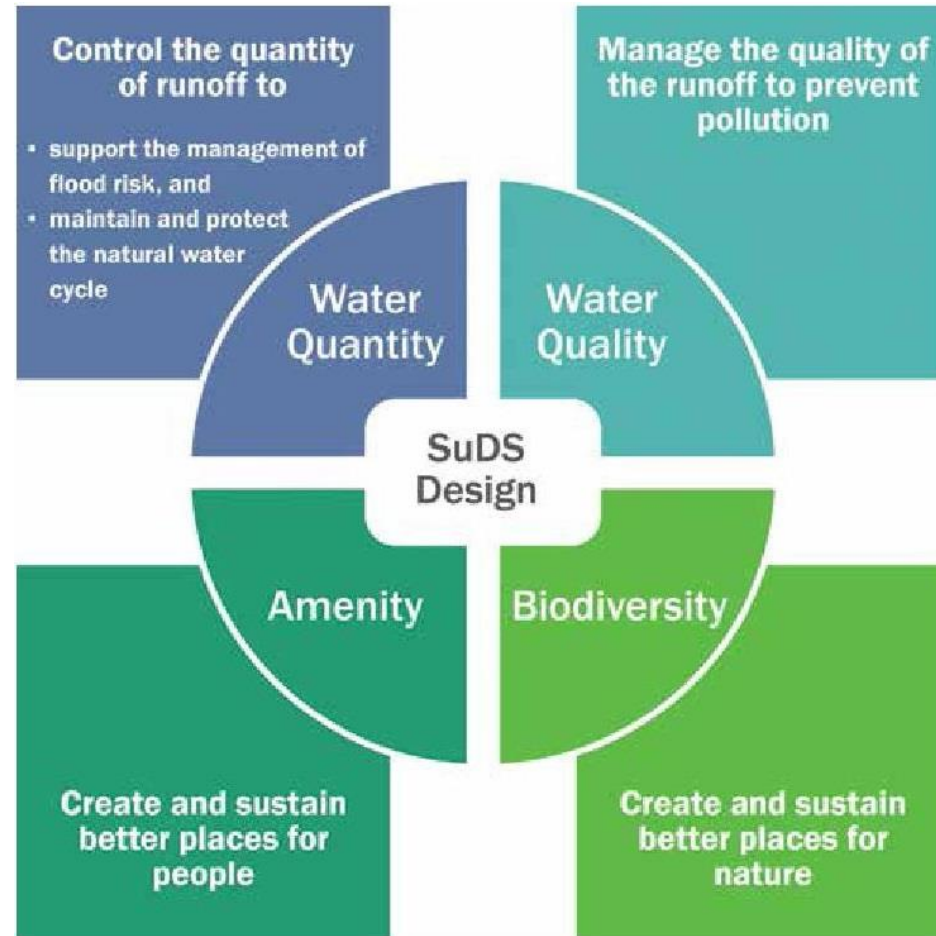


Figure 2.1 The four pillars of SuDS design

This is also referred to as **Water Sensitive Urban Design (WSUD)** in **Australia**, **Sustainable Urban Drainage Systems (SUDS)** in the **United Kingdom**, and **low impact development (LID)** in the **United States**, and is cited by the U.S. Environmental Protection Agency (EPA)

Rain gardens

Zollhallen Plaza

Freiburg, Germany 2011

Atelier DREISEILT



The square is a fine example of **water sensitive urban design**, as it is **disconnected from the sewer system**.

No rain water is fed to the sewer system, instead the **ground water table is recharged**.

Beautiful **planters** provide infiltration points, and subsurface gravel trenches with innovative in-built filter medium reduce the hydraulic overload on the sewer system.

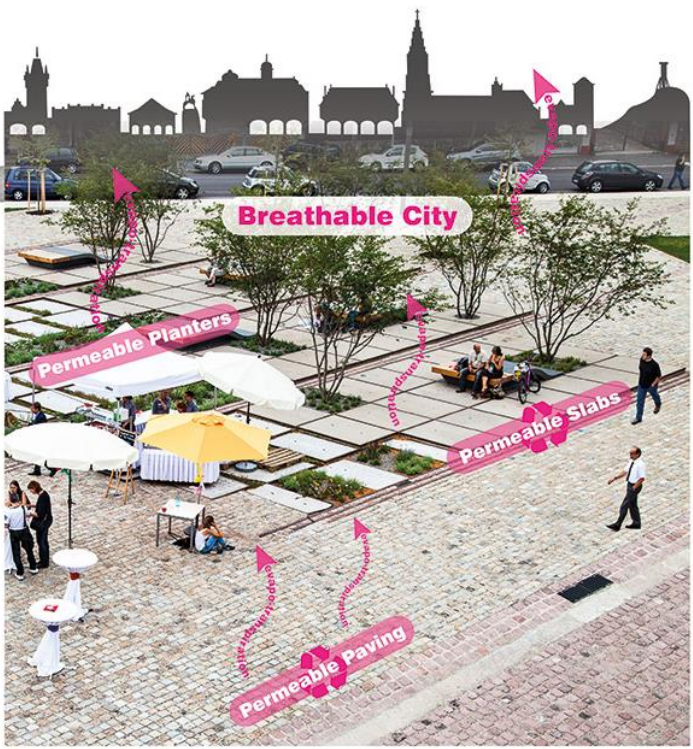
Indented plaza areas create a **surface flood zone**.

Area: 5600 m²



Cloudburst Plaza Dry

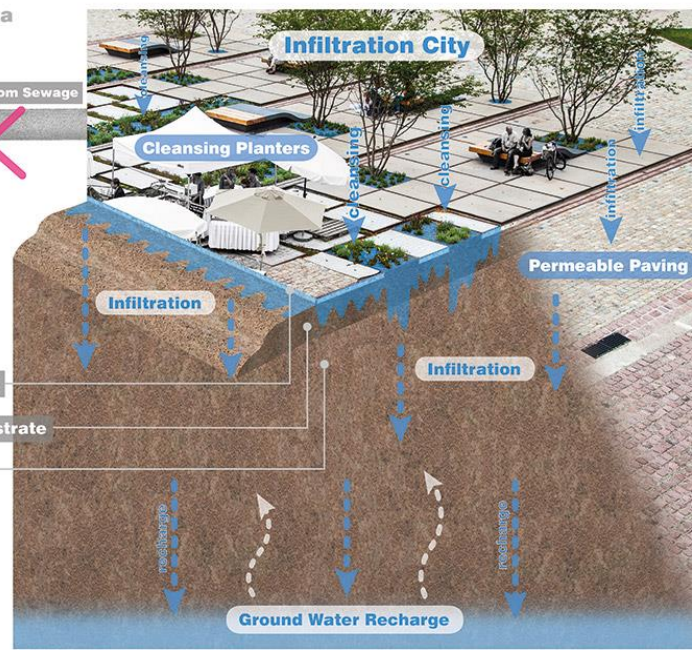
Disconnect from Sewage



Zollhallen Plaza

Cloudburst Plaza Regular Rain

Disconnect from Sewage



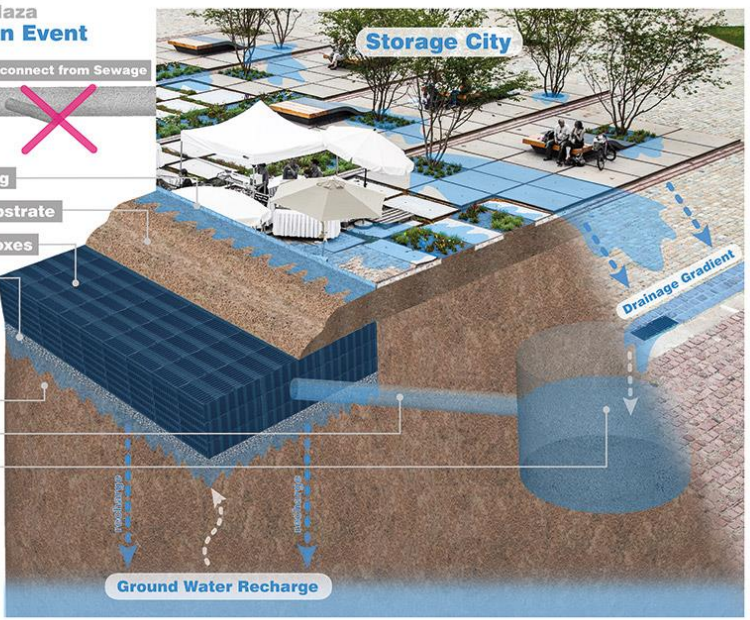
Cloudburst Plaza 10 Year Rain Event

Disconnect from Sewage



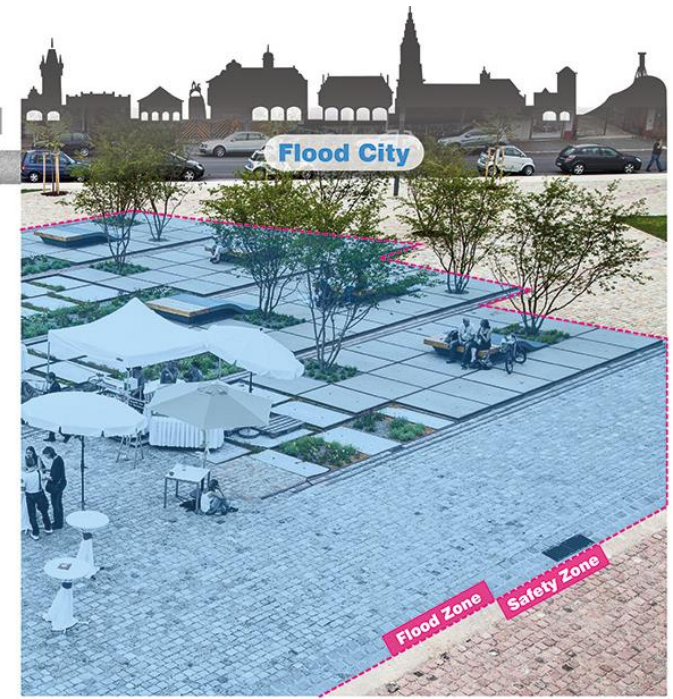
- Permeable Paving
- Load-bearing Substrate
- Water Storage Boxes
- Filtration Layer

- Sub-soil
- Overflow Pipe
- Sistern



Cloudburst Plaza 100 Year Flood

Disconnect from Sewage

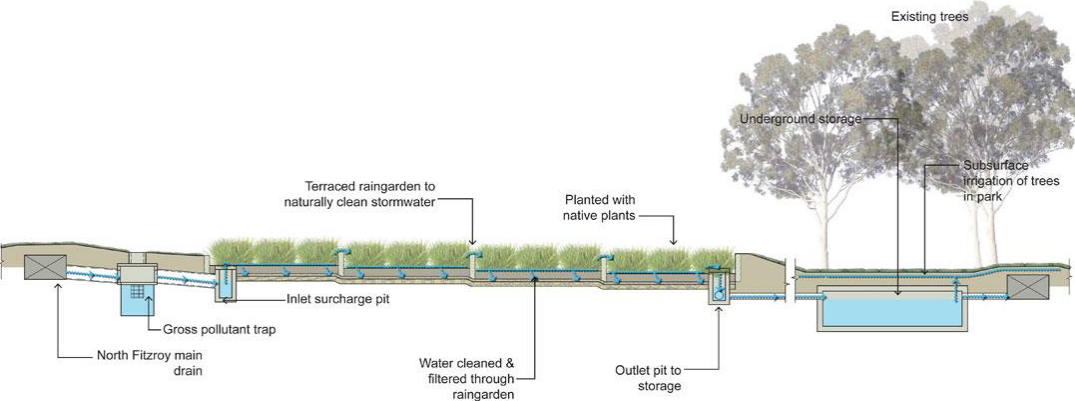


Rain gardens

Edinburgh Gardens Raingarden,
Melbourne, Australia 2012
GHD Pty Ltd

The raingarden is to provide a **sustainable source of treated stormwater for the parks mature trees and sporting fields** in a way that added to the existing landscape character of the park and added interest for users.

This raingarden is **designed to remove 16,000 kg of annual total suspended solids** per year of operation. It will also **remove a further 160 kg of nutrients, phosphorus and nitrogen**, through vegetation growth. This litter and pollutants would otherwise end up in Melbourne's waterways. **Filtered water is then collected into a 200KL underground storage tank**, and used to irrigate existing trees within the Edinburgh Gardens



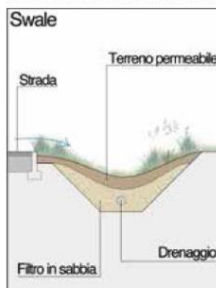
Rain gardens

Edinburgh Gardens Raingarden,
Melbourne, Australia 2012
GHD Pty Ltd



DISPOSITIVI WATER SENSITIVE. UN REPERTORIO

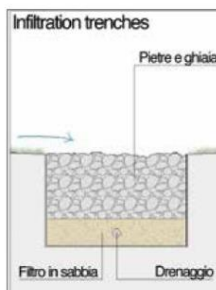
WATER SENSITIVE DEVICES. AN INVENTORY



SWALE E/AND BIORETENTION SWALE

Elementi lineari di connessione assimilabili a canalette, utili al convogliamento e al trasporto delle acque meteoriche, verso altri dispositivi WSUD, aventi una sezione variabile generalmente non impermeabilizzata e vegetata e pendenze comprese tra 1 e 4%, utili a minimizzare l'erosione. Il ruscellamento avviene a cielo aperto, in una sezione completamente libera, oppure in parte in superficie ed in parte all'interno di tubi drenanti sommersi in sabbie utili a effettuare una prima depurazione delle acque piovane (bioretention swale).

Connecting linear elements similar to ditches used to channel and convey stormwater to other WSUD devices. The profile varies and is generally permeable and vegetated, with a slope between 1 to 4% to minimize erosion. Runoff passes unrestrained in an open air section, or partly on the surface and partly in drainage pipes submerged in sand media filters to carry out initial purification of rainwater (bioretention swale).



INFILTRATION TRENCHES

Elementi lineari drenanti, assimilabili a canalette di sezione variabile, utili a catturare il deflusso superficiale delle acque in zone impermeabili rallentandole, contenendole, infiltrandole nel suolo o convogliandole in altri dispositivi WSUD. Lo scavo, generalmente di sezione poco profonda, è rivestito di tessuto non tessuto e riempito di ghiaia e pietrame. In terreni pesanti sul fondo può essere applicato anche un tubo drenante.

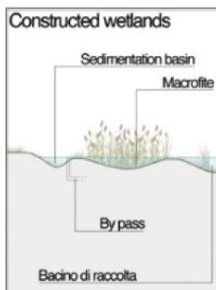
Linear drainage elements similar to ditches of variable profile used to capture runoff water in impervious areas to slow, channel, and allow it to penetrate into the ground or to convey it to other WSUD devices. Generally of a shallow profile, the excavation is lined with non-woven fabric and filled with gravel and stones. In heavy soils a drainage pipe on the bottom may also be installed.



SAND FILTERS

Elementi lineari assimilabili a pozzi drenanti utili a catturare il deflusso superficiale delle acque in zone impermeabili e operare un filtraggio per procedimenti meccanici. Sono costituiti da una camera di sedimentazione, atta a far depositare sedimenti di medie o grandi dimensioni, e da una seconda camera, separata a mezzo di un setto sul quale l'acqua tracima; quest'ultima è riempita di strati di sabbie utili al filtraggio delle particelle fini e degli inquinanti disciolti nell'acqua che, così depurata, si raccoglie in un tubo drenante.

Linear elements similar to drainage pools used to capture runoff in impervious areas and filter it through mechanical processes. They consist of two-chamber tanks where medium and large sediments precipitate in an upper chamber, which is separated from a second chamber by a permeable septum, while a lower chamber contains a sand media filter to trap fine particles and dissolved pollutants before the purified water drains out of a pipe at the bottom.



CONSTRUCTED WETLAND

Dispositivi areali di raccolta, stoccaggio e rilascio graduale delle acque (piovane o convogliate tramite altri dispositivi WSUD) assimilabili a paludi e stagni poco profondi, atti a rimuovere sostanze inquinanti fini, particelle colloidali e contaminanti disciolti a mezzo di processi fisici (sedimentazione) associati a processi chimici (disinfezione con raggi UV) e biologici quali fitodepurazione operata dal taxon ecologico-funzionale delle macrofitte acquatiche.

Areal devices similar to shallow swamps and marshes used to collect, store and gradually release water (rainwater or water previously treated by other WSUD devices). They remove pollutants, colloidal particles and dissolved contaminants through physical processes (sedimentation) associated with chemical processes (UV disinfection) and organic phytoremediation using aquatic macrophytes.

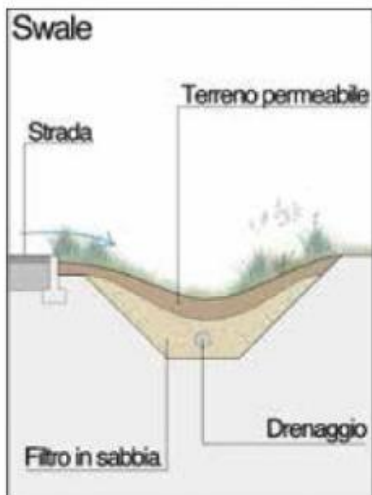
DISPOSITIVI WATER SENSITIVE. UN REPERTORIO

WATER SENSITIVE DEVICES. AN INVENTORY



SWALE E/AND BIORETENTION SWALE

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SWALE E/AND BIORETENTION SWALE

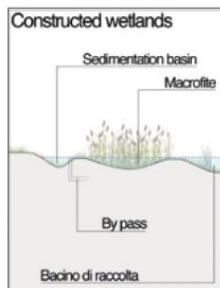
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Connecting linear elements similar to ditches used to channel and convey stormwater to other WSUD devices. The profile varies and is generally permeable and vegetated, with a slope between 1 to 4% to minimize erosion. Runoff passes unrestrained in an open air section, or partly on the surface and partly in drainage pipes submerged in sand media filters to carry out initial purification of rainwater (*bioretention swale*).



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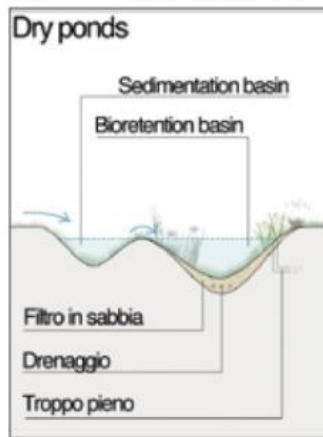
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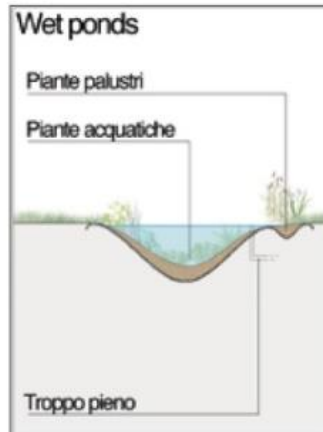
Areal devices similar to shallow swamps and marshes used to collect, store and gradually release water (rainwater or water previously treated by other WSUD devices). They remove pollutants, colloidal particles and dissolved contaminants through physical processes (sedimentation) associated with chemical processes (UV disinfection) and organic phytoremediation using aquatic macrophytes.



DRYPONDS

Elementi areali depressi e generalmente poco profondi, di forme e scale diverse, soggetti ad allagamento temporaneo, utili a convogliare e rallentare le acque (piovane o convogliate tramite altri dispositivi WSUD) e a trattarle tramite procedimenti meccanici. La sezione è generalmente provvista di due compartimenti: i *sedimentation basin* dove i sedimenti grossolani e medi precipitano ed i *bioretention basin*, dove la sabbia opera il filtraggio delle particelle fini.

Sunken and generally shallow areal elements of various shapes and sizes, subject to temporary flooding, used to channel and slow water (rainwater or water previously treated by other WSUD devices) and to treat it through mechanical processes. There are generally two compartments: a sedimentation basin where coarse and medium sediments precipitate and a bioretention basin, where a sand media traps fine particles.



WETPONDS

Elementi areali depressi e generalmente profondi assimilabili a stagni, di forme e scale diverse, soggetti ad allagamento permanente, utili a convogliare, rallentare, stoccare le acque (piovane o convogliate tramite altri dispositivi WSUD) e a trattarle. Anche in questo caso la depurazione è effettuata combinando procedimenti biologici e chimici (fitodepurazione con macrofite di ambiente palustre ed esposizione agli UV).

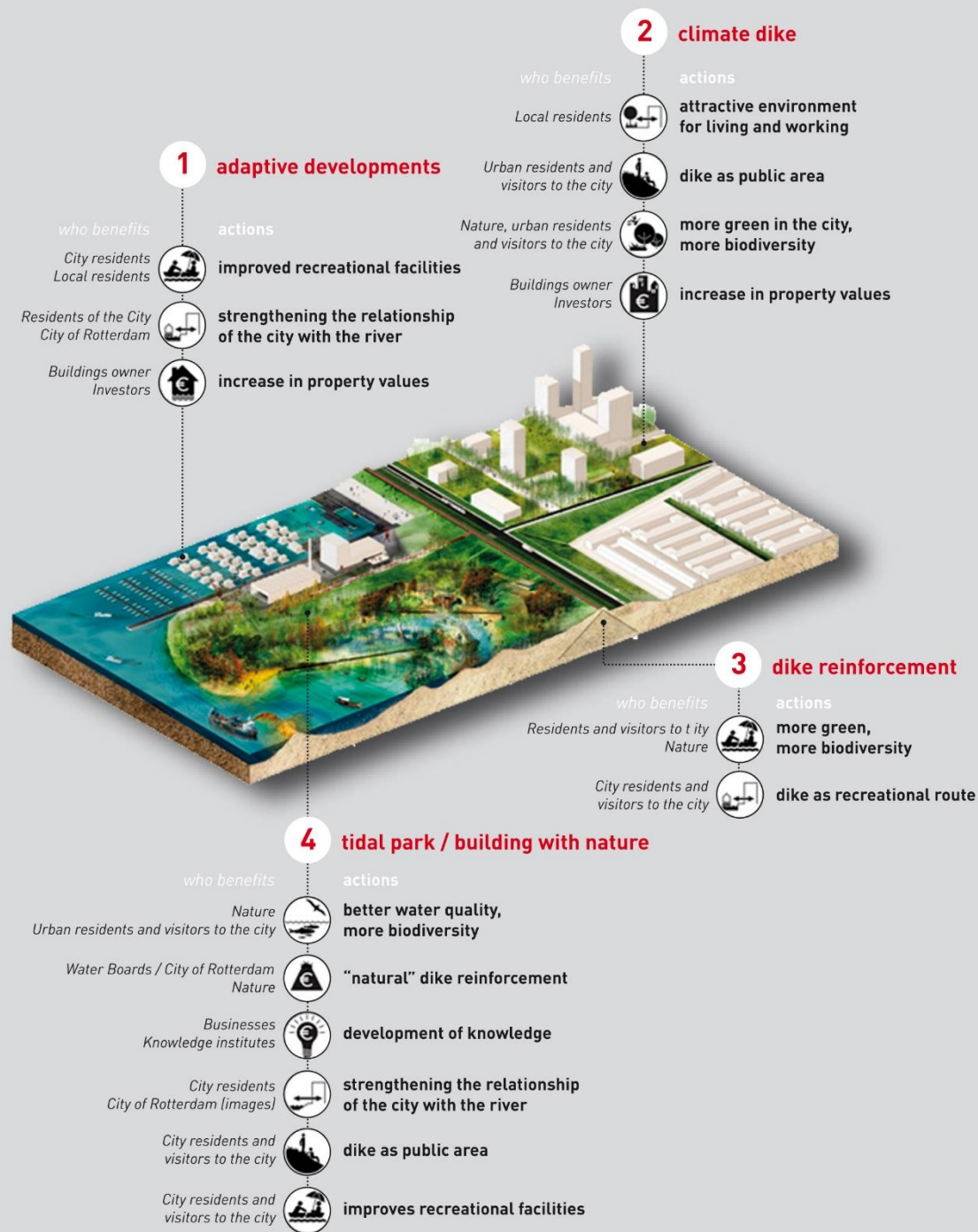
Deep sunken areal elements of various shapes and sizes, subject to permanent flooding, used to channel, slow, and store water (rainwater or water previously treated by other WSUD devices) and to treat it through a combination of biological and chemical processes (macrophyte phytoremediation and exposure to UV radiation).



POROUS PAVING

Pavimentazioni permeabili che permettono l'infiltrazione delle acque meteoriche nel suolo (e quindi in falda) o in appositi serbatoi di raccolta riducendo i fenomeni di *runoff* e consentendo la traspirazione. Trattasi di asfalti e cementi drenanti oppure di elementi modulari che consentono l'infiltrazione a livello dei giunti, messi in opera su un letto di sabbia.

Permeable pavements that allow stormwater to penetrate the ground (thereby replenishing groundwater) or special water tanks to reduce runoff phenomena and promote transpiration. They consist of draining asphalt or cement, or porous modular elements constructed on sand beds that allow penetration through joints.



Rotterdam “watercity 2030” and his *Waterplan2*

Climate adaptation and spatial development are inextricably intertwined in Rotterdam.

Waterplan2 links knowledge and experience to build a long-term environmental advantage.

Nearly 80% of the city and his surrounding region (over 600,000 pop.) lies below sea level (some parts by up to 6 m). For this reason Rotterdam is vulnerable to the climate change and the increasing water levels is becoming a threat to the city.

The *Waterplan 2* for Rotterdam “Water City 2030” combines water, green infrastructures and quality of life to design a blue-green vision for urban development and to define a long-term adaptive strategy to guaranteeing a climate-proof city.



A new water-based designs that effectively address the issue of climate change:



Waterplein-Bentemplein

water plazas and **parking garages** like **alternative forms of water storage**; **green roofs** and household **stormwater tanks** to lighten sewerage system; **linear green** areas, **sidewalk planters**, **bioswales**, **green facades**, small parks and the planting of **trees** to prevent heat stress and enlarge the sponge capacity.

Vertical Garden

Patrick Blanc is a botanist and the inventor of the **Vertical Garden** (*Mur Végétal*).

Blanc's creations adorn the façades of hotels, shopping centers, museums and office buildings the world over.

Patrick Blanc's vertical gardens aim to show **how nature can be integrated into urban living** and densely populated areas.

Blanc argues: "Vertical Gardens are not a criticism [of] the city and concrete is not pushing nature further away. It brings man closer to nature."

Vertical gardens occupy otherwise unexploited areas of the city to provide a sustainable **alternative to horizontal gardens**.

BOOKS:

Patric Blanc, *The Vertical Garden, from nature to the cities*, Norton Press 2009

Anna Lambertini, *Vertical gardens*, Verba volant 2007



Musee du Quai Branly – Paris 2006

Place d'andillac - Toulouse 1997



Vertical Garden

USA Pavilion

Milan Expo 2015

Biber Architects

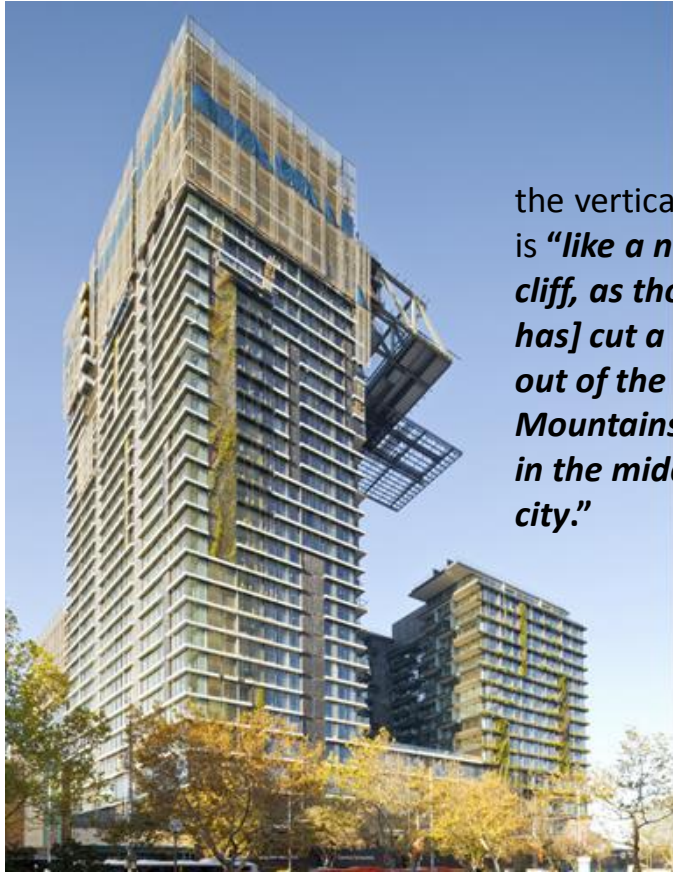
Expo Milano 2015 is the Universal Exhibition that Milan Italy, hosted in **2015**

Feeding the Planet, Energy for Life is the core theme
We need to make conscious political choices, develop sustainable lifestyles, and use the best technology to create a balance between the availability and the consumption of resources.



The **USA Pavilion** evokes the lines of a **traditional American barn**. It pays homage to America's rich agricultural history with an open design delimited by a large **vertical farm** that it was harvested daily.

One Central Park Sidney 2013



the vertical gardens is *“like a natural cliff, as though [one has] cut a giant slice out of the Blue Mountains and put it in the middle of the city.”*

Vertical Garden



One of the latest work of Peter **Blanc** is **One Central Park**, a new apartment complex in **Sydney**'s inner western suburb of Ultimo, projected by the architect Jean Nouvel.

Span 1000 square meters and sprawl across the building's 2 towers, which are 16 and 33 stories high. **150 m. high, they are the tallest vertical gardens in the world.** Comprising 21 panels, 30,000 shrubs and 70,000 plants – **nearly 360 mostly native species**, with many drawn from Australia's south-eastern region of Wentworth Falls.

Vertical Garden

One Central Park

The strong green character of the building is not only a quirk aesthetic ; it is a **complex system km0 powered**, flanked by **efficient systems for the recovery of water and the exploitation of energy**.

The project has **2 key technological features**:

Hydroponic technology lets you use the recycled water from the waste water treatment to irrigate the plants and green walls

the heliostats allow you to bring programmable amount of solar energy in the shadows of the project by distributing light and heat.



«Vertical forest»

Milan, 2014

Boeri Studio

It is composed of 2 residential towers of **110 and 76 m height** that **host 900 trees** (each measuring 3, 6 or 9 meters) and **over 2000 plants** from a wide range of shrubs and floral plants distributed in relation to the façade's position towards the sun.

On flat land, each Vertical Forest equals, in amount of trees, an area of **7000 m² of forest**

It is a model of **vertical densification of nature within the city** that operates in relation to **policies for reforestation and naturalization** of large urban and metropolitan borders.

WINNER OF INTERNATIONAL HIGHRISE AWARD 2014



«Vertical forest»



Vertical Forest increases biodiversity.

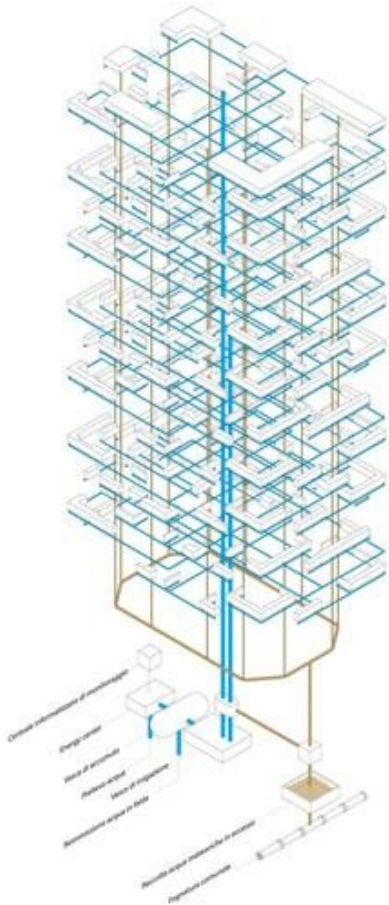
It helps to set up an urban ecosystem where different kinds of vegetation create a **vertical environment** which can also be **colonized by birds and insect.**

Vertical Forest helps to build a micro-climate and to filter dust particles which are present in the urban environment

Vertical Forest is a landmark in the city



«Vertical forest»



WATER SUPPLY SYSTEM



VEGETATION



VERTICAL FOREST

Urban forest

BENEFITS OF URBAN TREES



Strategic placement of trees in urban areas can **cool the air** by between 2 °C and 8 °C.



Large urban trees are excellent **filters for urban pollutants** and fine particulates.



Mature trees **regulate water flow** and improve water quality.

A tree can absorb up to 150 kg of CO₂ per year, sequester carbon and consequently **mitigate climate change**.



Wood can be used for **cooking and heating**.



Trees can **provide food**, such as fruits, nuts and leaves.

Spending time near trees **improves physical and mental health** by increasing energy level and speed of recovery, while decreasing blood pressure and stress.



Trees properly placed around buildings can **reduce air conditioning needs** by 30% and **save energy used for heating** by 20–50%.

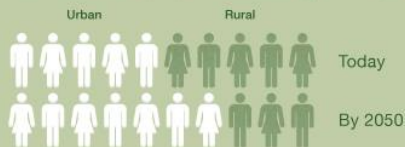


Trees provide habitat, food and protection to plants and animals, **increasing urban biodiversity**.



Landscaping, especially with trees, can **increase property values** by 20%.

World urban population is growing fast...



...planting trees today is essential for future generations!

Urban and peri-urban forestry has been gaining attention in recent years as a **valuable tool for addressing a number of urban challenges in the development of a more sustainable and resilient city model**.

Urban and peri-urban forestry (UPF)

is the practice of managing forests, groups of trees and individual trees in and around urban areas in order to maximize their economic, livelihood, social, cultural, environmental and biodiversity values .

It can serve a range of purposes and thus takes many forms, covering natural and planted forests and trees, forests maintained in watersheds or in drylands, forests and wooded areas, green spaces and street trees, as well as trees in urban/peri-urban gardens.



Urban forest

28 November / 1 December 2018

Mantua, Italy

CHANGING THE NATURE OF CITIES

1st World Forum on Urban Forests

"Changing the nature of cities: the role of urban forestry for a green, healthier and happier future"

28 November – 1 December 2018, Mantua, Italy

The key reasons for launching a periodical global appointment on urban forests and green infrastructure are:

Supporting the process of the New Urban Agenda and optimizing actions related to urban ecosystems and green spaces.

Creating an international appointment (through periodic worldwide meetings) for the urban forest and green infrastructure actors and stakeholders.

Strengthening the already existing international networking by creating concrete opportunities to meet and exchange experiences and build partnerships.

Launching a Mantova Green Cities Challenge towards a better quality of life in world cities.



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COMUNE DI
MANTOVA



POLITECNICO
MILANO 1863



SISEF

20 anni gruppo
Tea
acqua energia ambiente



Urban forest

Urban forests play an important role in **ecology** of human habitats in many ways:

they

- filter air, water, sunlight
- provide shelter to animals
- provide recreational area for people
- moderate local climate
- slowing wind and stormwater
- and shading homes and businesses to conserve energy.
- cooling the urban heat island effect
- potentially reducing the number of unhealthy ozone days that plague major cities in peak summer months

Urban forest

Garden in rue de Meaux

Paris, France 1991

C. Dalnoky, M. Desvigne

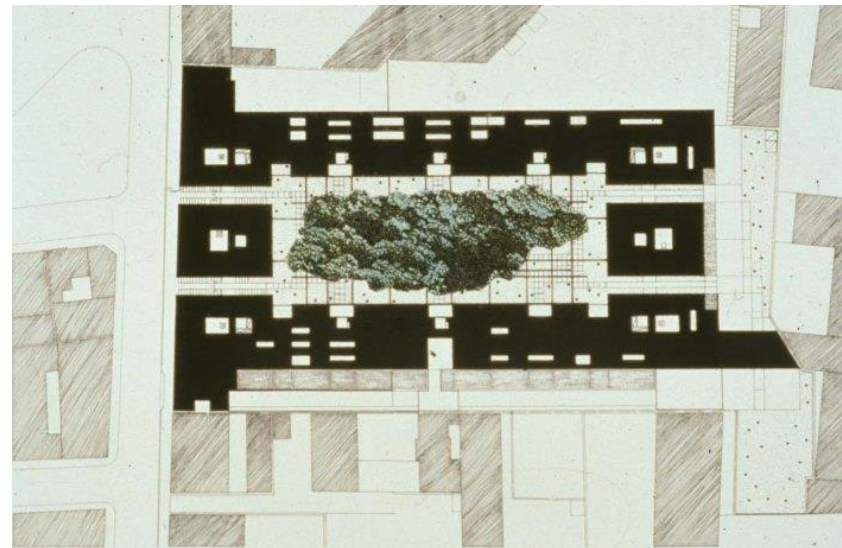
Project of the building:

arch. **Renzo Piano**



The use of slender **tall trunk trees** (birch), combined with **compact geometric hedges** has created a very particular and pleasant environment.

Standing out on a background of rampant Honeysuckle which stretches from facade to facade, **a swarm of birch rises towards the sky.**



Urban forest

Millennium Park

London 2000

Dalnoky + Desvigne

The site was a former gasworks that required radical decontamination efforts that leveled the site and created a tabula rasa. Desvigne rejected the idea of creating a large urban park with predictable lawns, playgrounds, and natural areas. Instead, he advocated for the creation of an **“intermediate landscape” to give texture and density to the formless site.**

Inspired by images of aerial photos of alluvial forests, Desvigne called for more than twelve thousand native hornbeam trees and over one hundred thousand shrubs to be **densely planted in a grid with clearings** indicated for future park activities.

The design creates a flexible framework for future development that considered the park’s evolution through time.



The famous **sequence in plan and section drawings**, depicts a detail of the intermediate typical landscape of Desvigne at **intervals of 10, 25 and 50 years.**



Urban forest

Intesa Sanpaolo Tower
Turin, 2006-2015
Atelier Corajoud,
Studio Giorgetta

Project of the building: arch.
Renzo Piano



The garden at the foot of the tower is actually **an open air court** at the level of the first underground floor, on which several major services open (kindergarten, local restaurant for employees, the bank for the public).

It's a **roof garden**, as there are two floors of underground parking, the plants are dwells in a deep 150 cm formed by volcanic lapilli and special molds.

3 species of birch (*Betula pendula*, *Betula utilis* and *Betula papyrifera*), some large breed evergreen shrubs, while the parterre is formed by polychrome plots of perennial herbaceous plants.

Urban forest

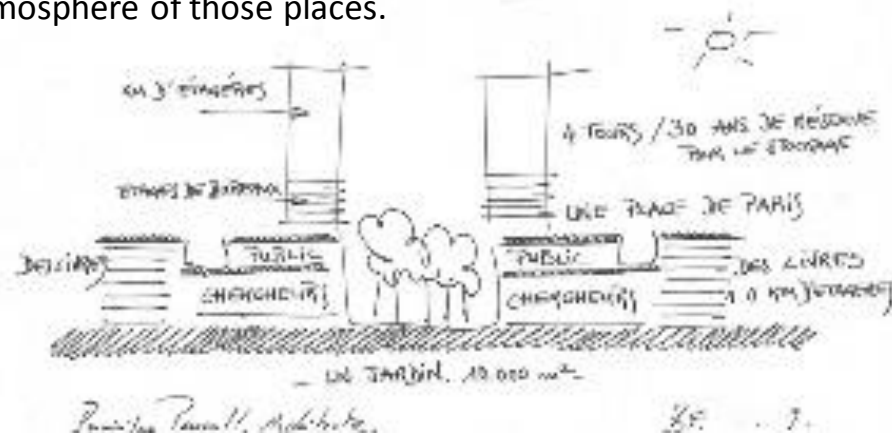


Bibliothèque nationale François Mitterrand

Paris, France 1989-1996

Building: Dominique Perrault – Gaele Lauriot Prévost

4 L-shaped corner towers (as open books) open towards the center, delimit the great central void, a large square that extends for 400 m in length and 10 m below the level of the Seine. The project re-reads the typical plant of the cloisters of the monasteries evoking the timeless and silent atmosphere of those places.





Urban forest

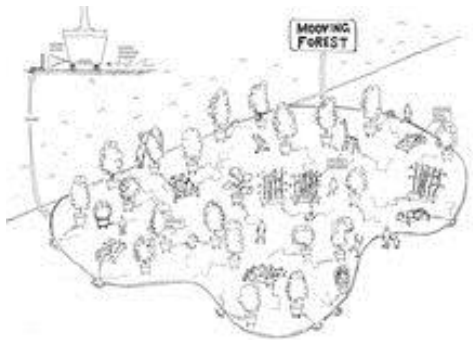


Moving forest

by NL Architects

(they realised a wide variety of provocative and humorous projects)

The project is their answer to the lack of green in contemporary urban environments. One might occasionally find a carefully designed patch of plants or shrubbery there, but nothing like the majestic parks and shady trees that can be found in historical city centres. **So they designed a park on wheels, with trees in shopping carts.** Around a small street bench, the public can rearrange their own little park and thus create a nice green view and a bit of shade.



Urban forest

Liuzhou Forest City Masterplan

By Stefano Boeri Architetti

From 2015 Boeri is engaged in the study and design of prototypes of Forest City in different regions of China. In 2017 **Liuzhou Forest City Masterplan**, the urban settlement fighting atmospheric pollution was approved by Liuzhou Municipality Urban Planning.

The first Chinese Forest City presents offices, houses, hotels, hospitals and schools are entirely covered by plants and trees. Once completed, the new city will host 30,000 people, **absorb almost 10,000 tons of CO2** and **57 tons of pollutants per year and produce approximately 900 tons of oxygen.**

<https://www.stefano boeriarchitetti.net/en/project/liuzhou-forest-city/>



Urban forest

Plants and trees are over every building, of all sizes and functions

Liuzhou Forest City will host in total **40,000 trees** and almost **1 million plants** of over 100 species.

The diffusion of plants, not only in the **parks and gardens or along the streets**, but also **over building facades**, will allow the energy self-sufficient city to contribute to improve the air quality, to decrease the average air temperature, to create noise barriers and to improve the biodiversity of living species, generating the habitat for birds, insects and small animals that inhabit the Liuzhou territory.

