

# Campus Botanicus strengthening hortus and campus symbiosis

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**TU**Delft

Delft  
University of  
Technology

Image Rosa de Wolf



## Urban ecology

Forman (2014) :

**Urban ecology: the whole of interactions of organisms, built structures, and the physical environment, where people are concentrated.**

Tillie (2024) :

b

**Urban Ecology Design: Using design and urban ecology principles to create biodiverse, regenerative and resilient living environments .**

Photo: Nico Tillie : Changing environment of Dakakker in Rotterdam in 7 years time, high biodiversity in the city center, peregrine Falcon in the former office tower

# Testing in projects



## Dune plantation in the city and new species





# URBAN ECOLOGY DESIGN LAB

TU Delft Research & Design  
Group At The Faculty Of  
Architecture And The Built  
Environment

# More than urban ecologies...

## Architectural



## Urban



## Agro



## Arid Urban



## Tropical



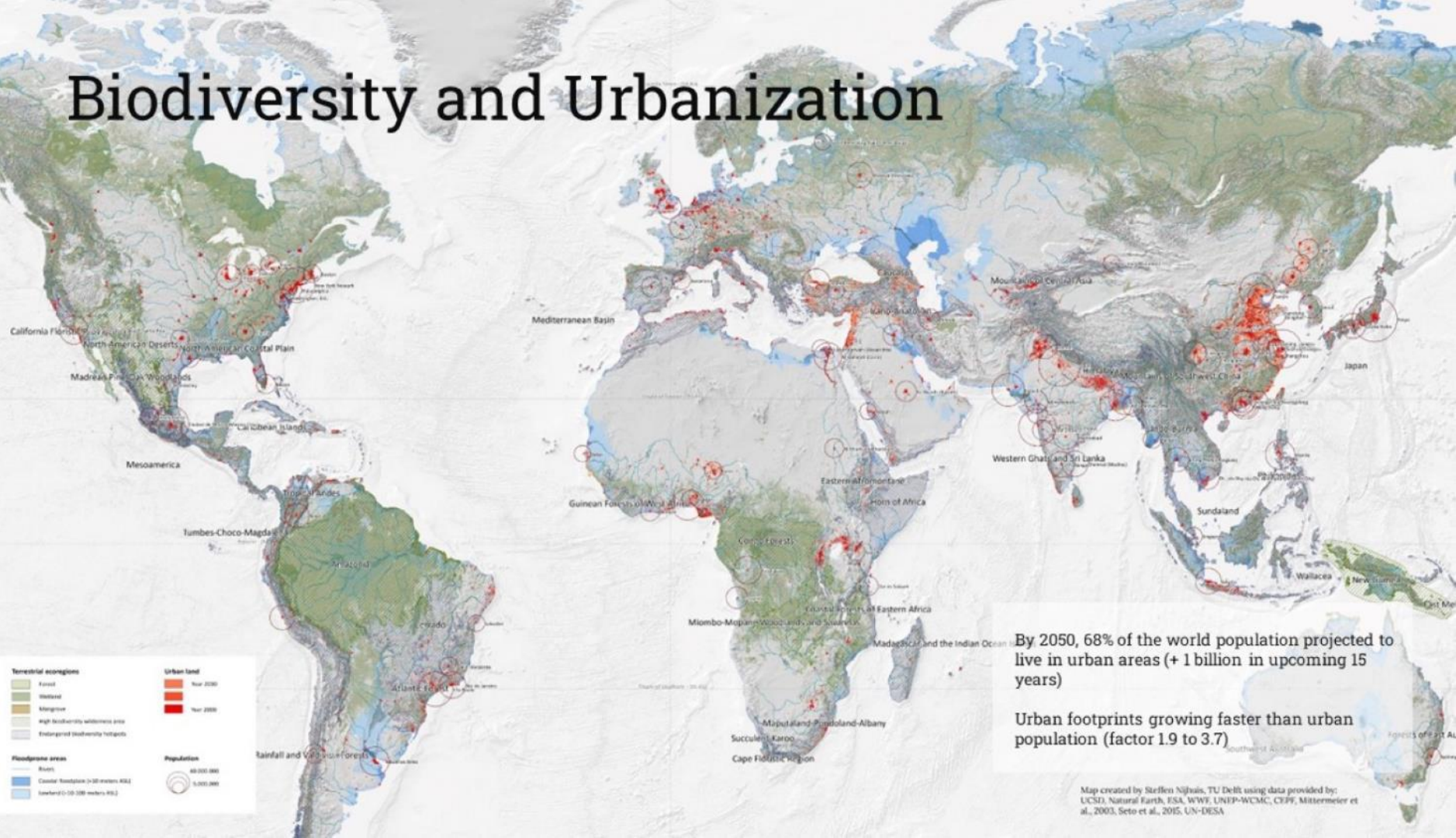
## Tropical urban



## Continental



# Biodiversity and Urbanization




By 2050, 68% of the world population projected to live in urban areas (+ 1 billion in upcoming 15 years)

Urban footprints growing faster than urban population (factor 1.9 to 3.7)

Map created by Staffen Nilvius, TU Delft using data provided by: UCSJ, Natural Earth, ESA, WWF, UNEP-WCMC, CEFF, Mittermeier et al., 2003, Seto et al., 2015, UN-DESA





A photograph of two men in a pine forest. The man on the left is wearing a white shirt and a dark cap, looking down at a young tree. The man on the right is wearing a brown shirt and a dark cap, also looking down. They are surrounded by tall pine trees and a young tree in the foreground. A semi-transparent text box is overlaid on the center of the image.

Applications of landscape-based solutions  
employing indigenous or traditional  
ethnobotanical and ecosystem knowledge

Regeneration of natural system: ecosystems  
and water + local culture + local community  
+ livelihoods

# Loess Plateau, China. Regeneration ecosystem, livelihoods, soil and groundwater

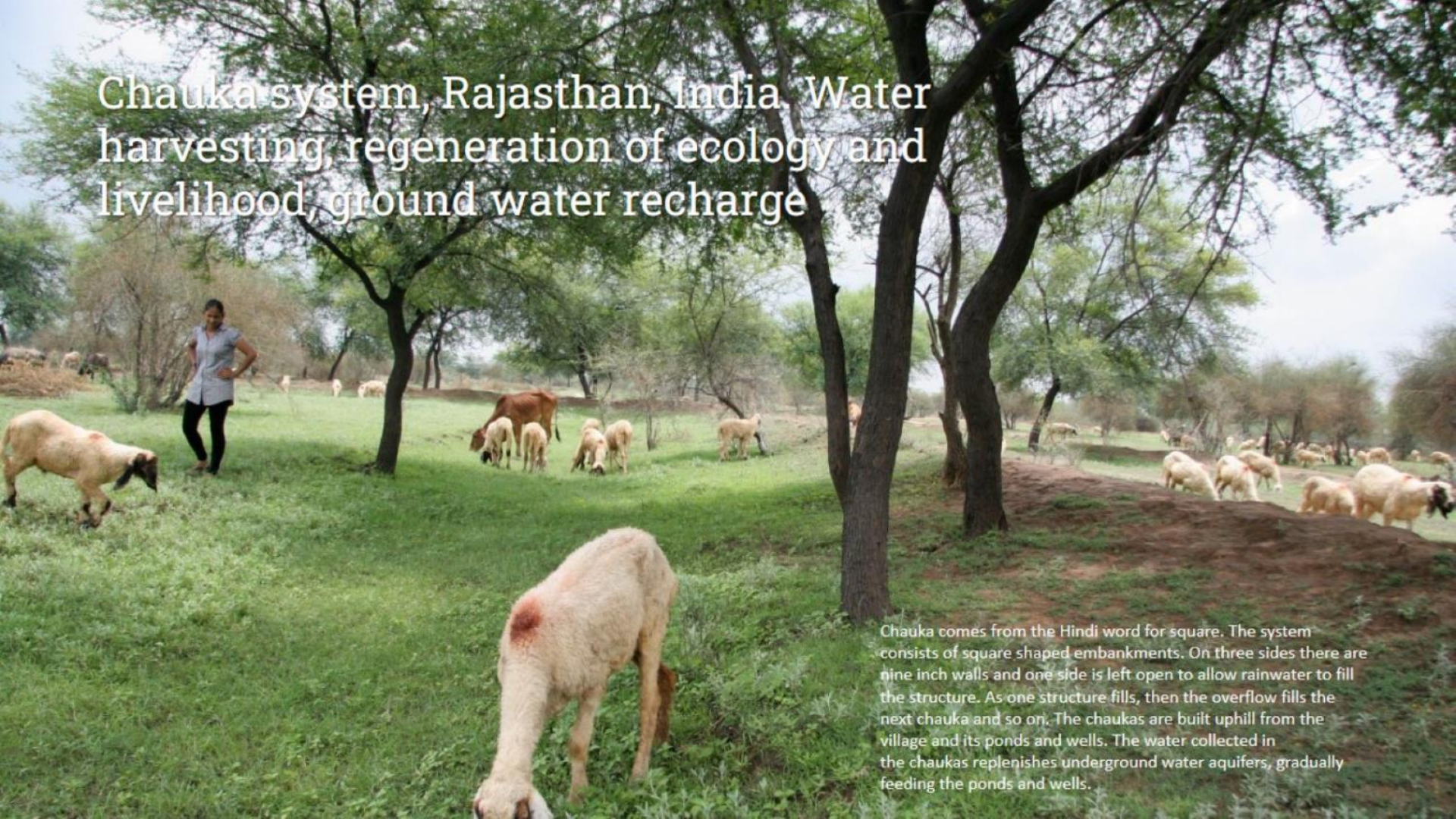


1995



2009

# Chauka system, Rajasthan, India. Water harvesting, regeneration of ecology and livelihood, ground water recharge



Chauka comes from the Hindi word for square. The system consists of square shaped embankments. On three sides there are nine inch walls and one side is left open to allow rainwater to fill the structure. As one structure fills, then the overflow fills the next chauka and so on. The chaukas are built uphill from the village and its ponds and wells. The water collected in the chaukas replenishes underground water aquifers, gradually feeding the ponds and wells.

# Greening Africa

An aerial photograph showing a large-scale reforestation project in a dry, brown landscape. The ground is covered in reddish-brown soil with visible erosion patterns. Numerous young green trees are planted in a grid-like pattern, each surrounded by a circular pit of dark brown soil. The trees are small and vibrant green, contrasting sharply with the arid background.

Creator: Barbara Gravelli

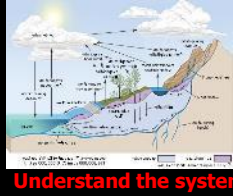
Copyright: ©IFAD, FAO, WFP (RBA)/Barbara Gravelli

# Also in NL with 'grienden and willow growth' and 'rabatbossen' in wet areas





# System-Habitat-Species ECOcampus



Understand the system



FOREST



Oak & beech



Forest birds



MEADOW



Wildflowers



Insects



SWAMP



Aquatic plants



Marsh birds



## TU Campus Dreamscape

# Biotope Map of the campus

Marlies Willemssen's screen



Image by Floris Beijer

# What does that mean for BK faculty square?

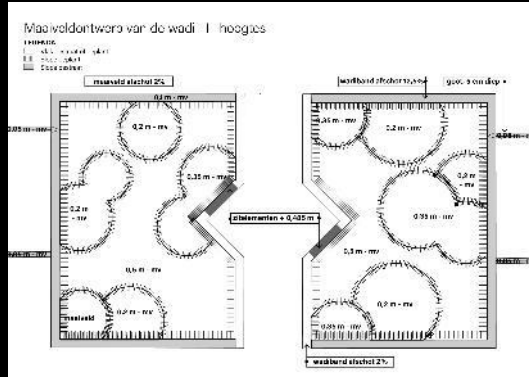


Initial proposal & final design: Nico Tillie, Rosa de Wolf – Urban Ecology Design, Rene van der Velde Urban Forestry, Rene Hoonhout Campus & Real Estate, Scetch design Hosper





# Multiple layered biodiversity: plants in valley- slopes- hills- shrubs and trees



# Synergies in one spot waterstorage, heat stress, biodiversity, public space- cultural heritage & research



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# Opening and the first flowers



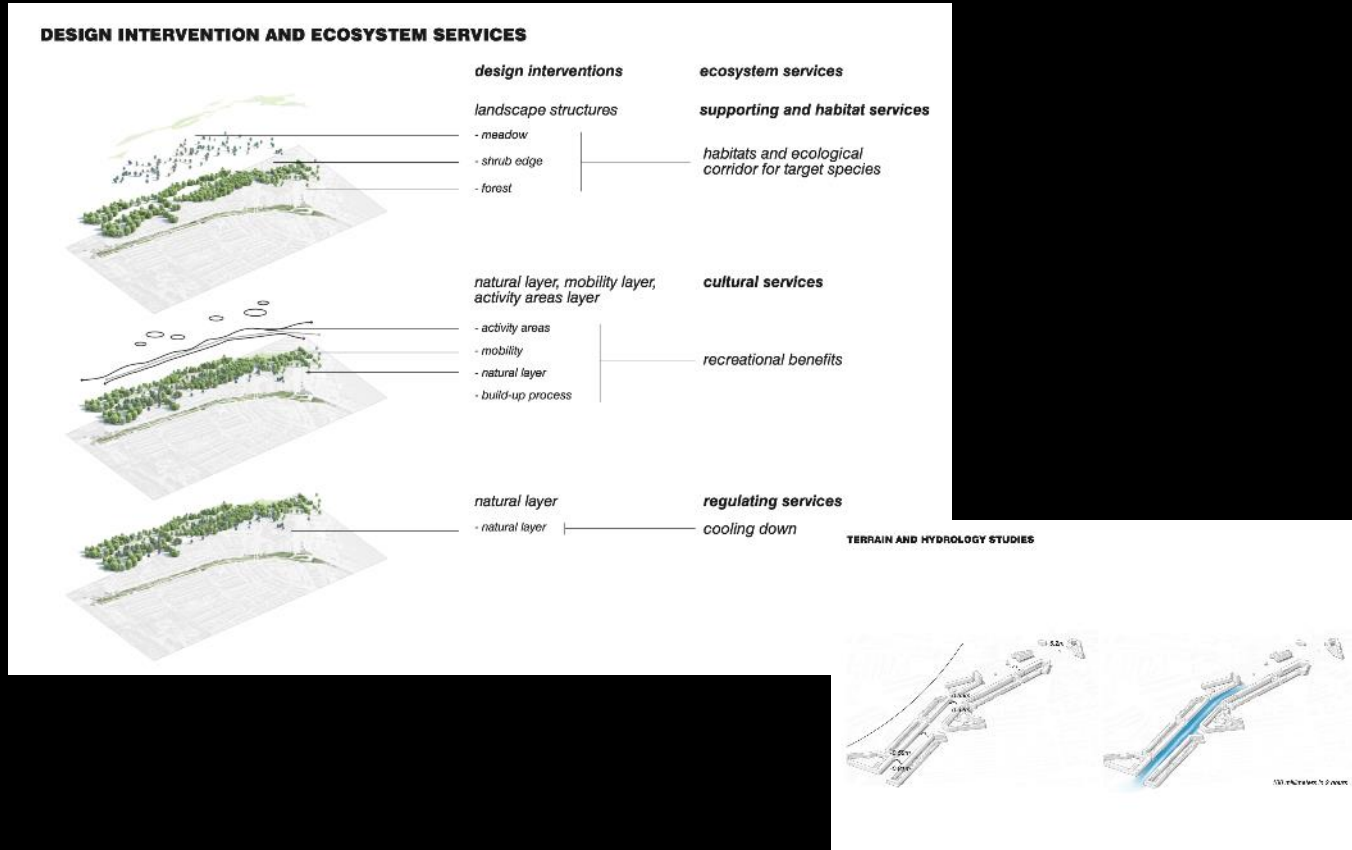
**iWADI CITY- The whole campus like a synergetic wadi-landscape – with a mix of native and planted species in high & low grounds – is this a new wetland arboretum?**



Urban Ecology Design Lab- Rendering Eline Holtes LA and Dariia Alieieva in workspaces of the future workshopweek

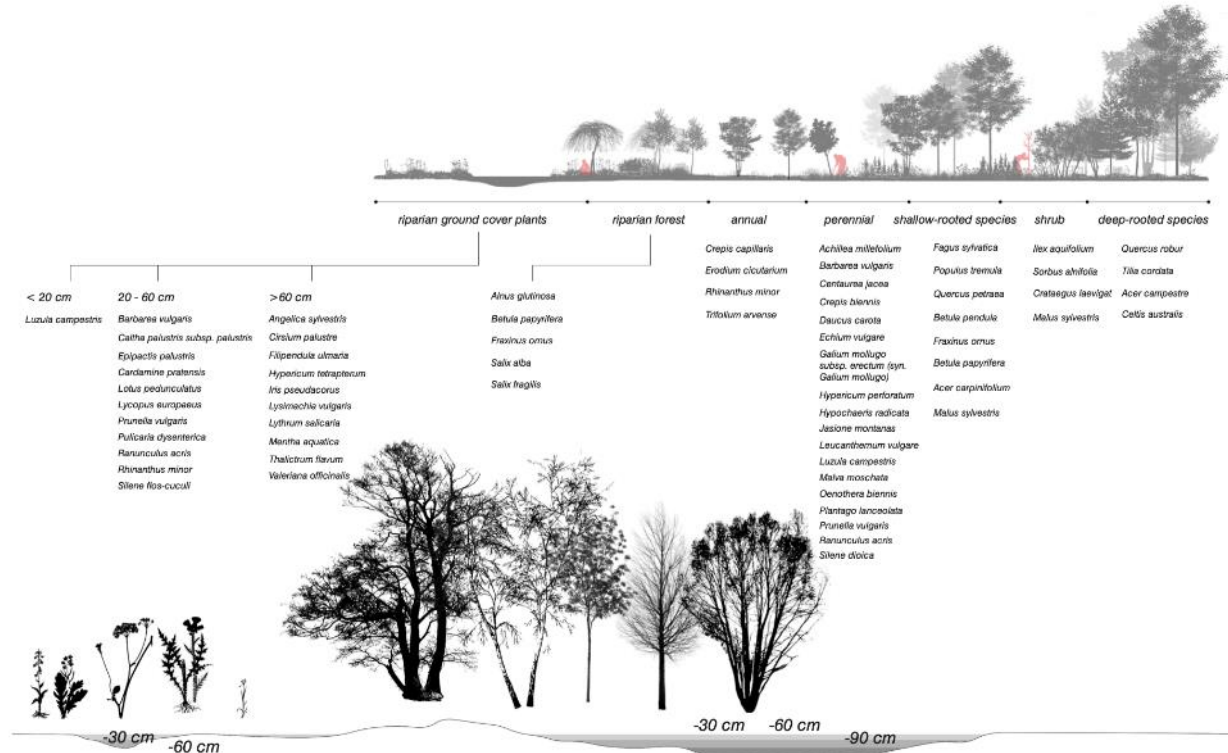
# From street trees to new habitats; create linear forests and bioswales in the city

By Pu Jiang graduation student Urban ecology lab - Landscape architecture 2021



# Many (native) species, young and old- more resilient

## FOREST SUCCESSION AND MANAGEMENT




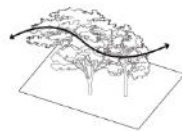
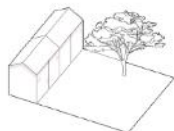



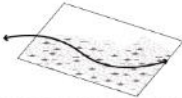















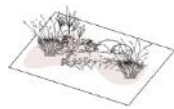







target species

moving behavior

nesting place

shelter

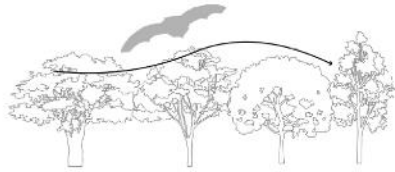
food



# Habitats and corridors for different species

## ECOLOGICAL STRATEGIES FOR ARTERIAL NETWORK IN SOUTH



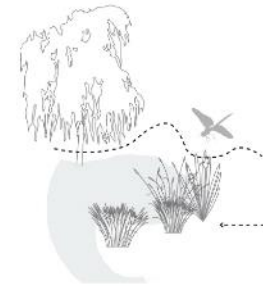
1. improve canopy continuity



2. improve bush continuity



3. improve species richness



4. plant water marginal vegetation,  
create terrain, increase water edges

# Urban Bocage- (houtwallen) Native and Bordeaux species irt biodiversity

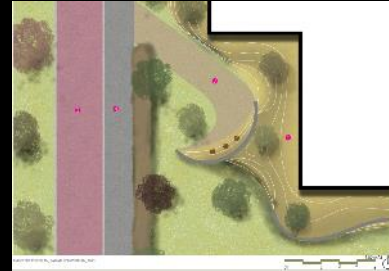
Sylva landschapsarchitecten, naturalis, urban ecology, terra nostra,  
Gemeente Den Haag, TU campus





**Sandy Urban soils turned into wild dune plantation and water infiltration**







## Ecologisch netwerk vraagt nieuwe groentypologieën

Tekst

Rosa de Wolf en Nico Tillie

Beeld

TU Delft

De openbare ruimte in de stad moet functioneren als een ecologisch netwerk om te komen tot een klimaatadaptieve en prettige leefomgeving voor zowel mensen als dieren. Vergroening is daarbij

## From bee burrows to continuous bee- or eco ridges



Ongeveer 70% van de wilde bijen nestelt in de grond. Een plek om te nestelen is net zo belangrijk voor het voortbestaan van soorten als voedselplanten. Een goed aangelegde bijenrug levert beide.

<https://platform-groen.nl/dashboard/artikel/ecologisch-netwerk-vraagt-nieuwe-groentypologieen/>

# The tea mint garden





# From Parking to Park(ing)- Faculty of Architecture



The vegetation planted by last year's ECOCampus students is thriving due to the wet weather conditions!



The first inhabitants moved into the Bee Totems as well.

Looking for more information on the plant species and design? Have a look at the totems at the East parking lot!





# Voorplein ME



Julius Knoester en Janine Schmeitz

# Voorplein ME



Julius Knoester en Janine Schmeitz

# Focal points from biodiversity village to food-, green- and blue village

All with input from the hortus



blue village a testing area for wetland housing and climate, materials and biodiversity

# Grow and test on campus Circularity & Biobased materials in buildings

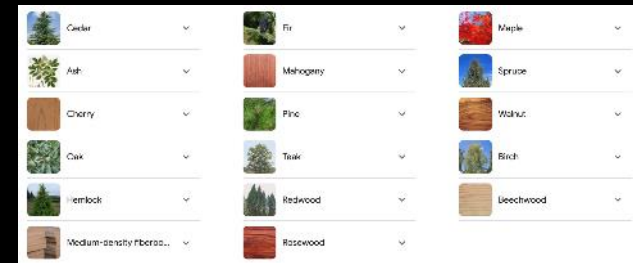
What 'archaeologists' find in old Dutch houses:

- Hemp insulation from the 19th century, still perfectly intact
- Flax insulation that retains heat for 100+ years
- Seagrass that has continued to perform since 1800
- Hay insulation that has lasted for centuries

This is what our ancestors used as insulation:

- Buckwheat husks against moisture, among other things
- Hop cones for soundproofing
- Coconut fibers in cavity walls
- Seagrass under roof tiles
- Hemp in exterior walls

- Source Joost van der Waal





## FOOD FOREST

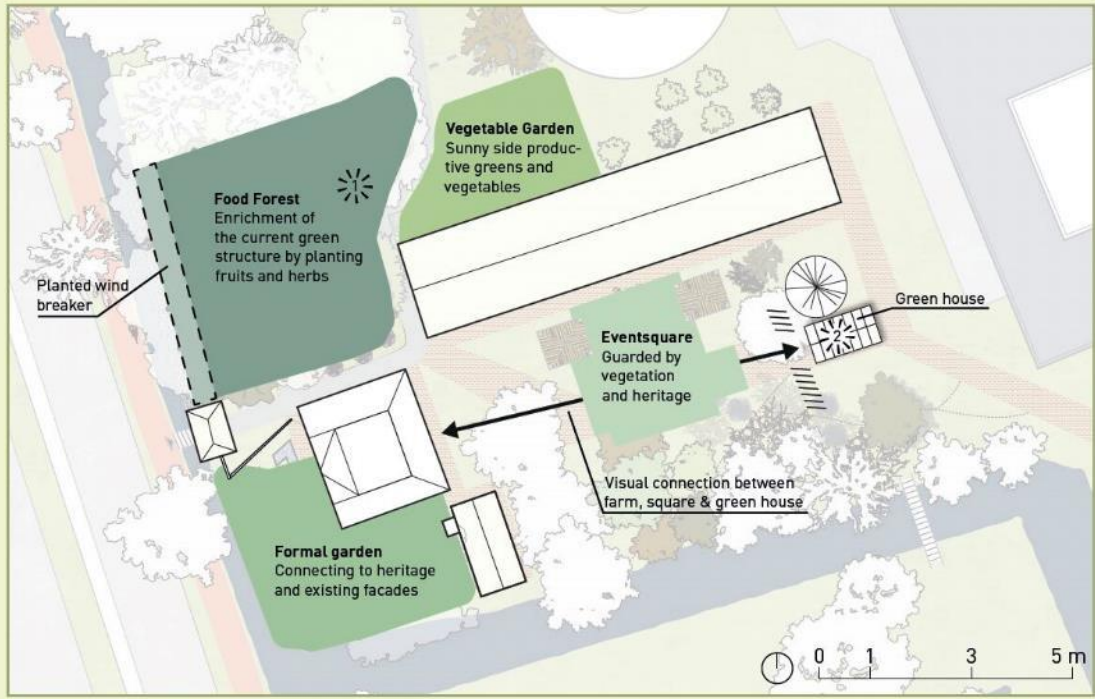
The food forest is a multi-layered, self-sustaining ecosystem of trees, shrubs, herbs, and vegetables. It is designed to be a productive and resilient space that can provide food and habitat for wildlife. The food forest is a key element of the sustainable design, providing a natural and productive space that can be used for food production and recreation.

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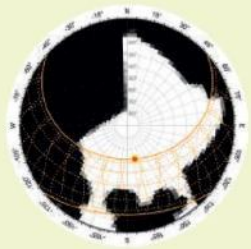


## FORMAL FRONT GARDEN

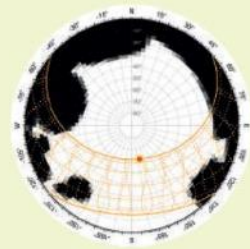
The formal front garden is a traditional garden design that features a central lawn, symmetrical flower beds, and a central path. It is designed to be a formal and structured space that can provide a place for recreation and social interaction. The formal front garden is a key element of the sustainable design, providing a traditional and structured space that can be used for recreation and social interaction.



## Greenhouse location options



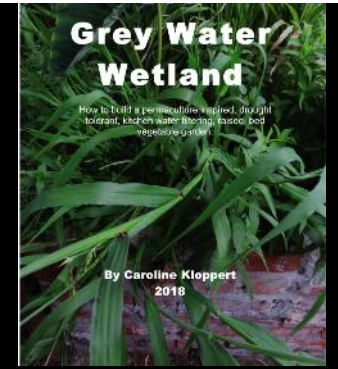
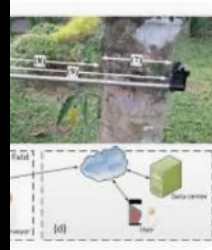
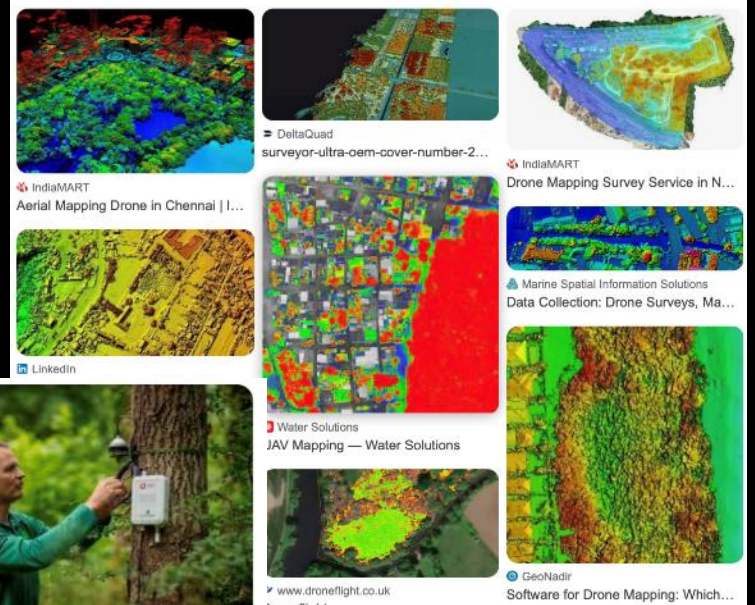
1. This spot is located in the proposed food forest near the existing green structure and on the north side. This gives the greenhouse a lot of shade during the year, minimizing crop production.



2. The place of the greenhouse on the side of the square gives it ample amounts of sunlight. Making it thereby possible to get optimal crop production and a central space within the proposed event space.

## Next steps Enrich these fields

- Drone – satellite –
- mapping & inventories
- Sensor technology
- Civil engineering
- Economics
- Ethics
- Archaeology



## 4. Some extra notions and synergies



# Daphne Schippersbrug and urban synergies....we need more urban synergies



## 2000 year old concept



# 2000 year old concept



<https://havechanged.blogspot.com/2014/07/ro>

**sprawl**



**High rise apartments**



**All this does not yet match the challenges we face!**

# Fairy tales or .....



Tolkien, Lord of the rings



Hundertwasser



Teletubby house

*the examples are out there...! Now turn them into attractive meaningful designs*

ChartierDalix

Livrés



English

Recherche

<https://www.chartier-dalix.com/project/groupe-scolaire-de-la-biodiversite-et-gymnase-a-boulogne-billancourt-92/>

Groupe scolaire de la Biodiversité et gymnase à Boulogne-Billancourt (92)

Informations



<https://www.chartier-dalix.com/2017/10/16/ecosystemes/>



**Biodiversity and  
climate challenges  
integrated into  
buildings and public  
spaces**



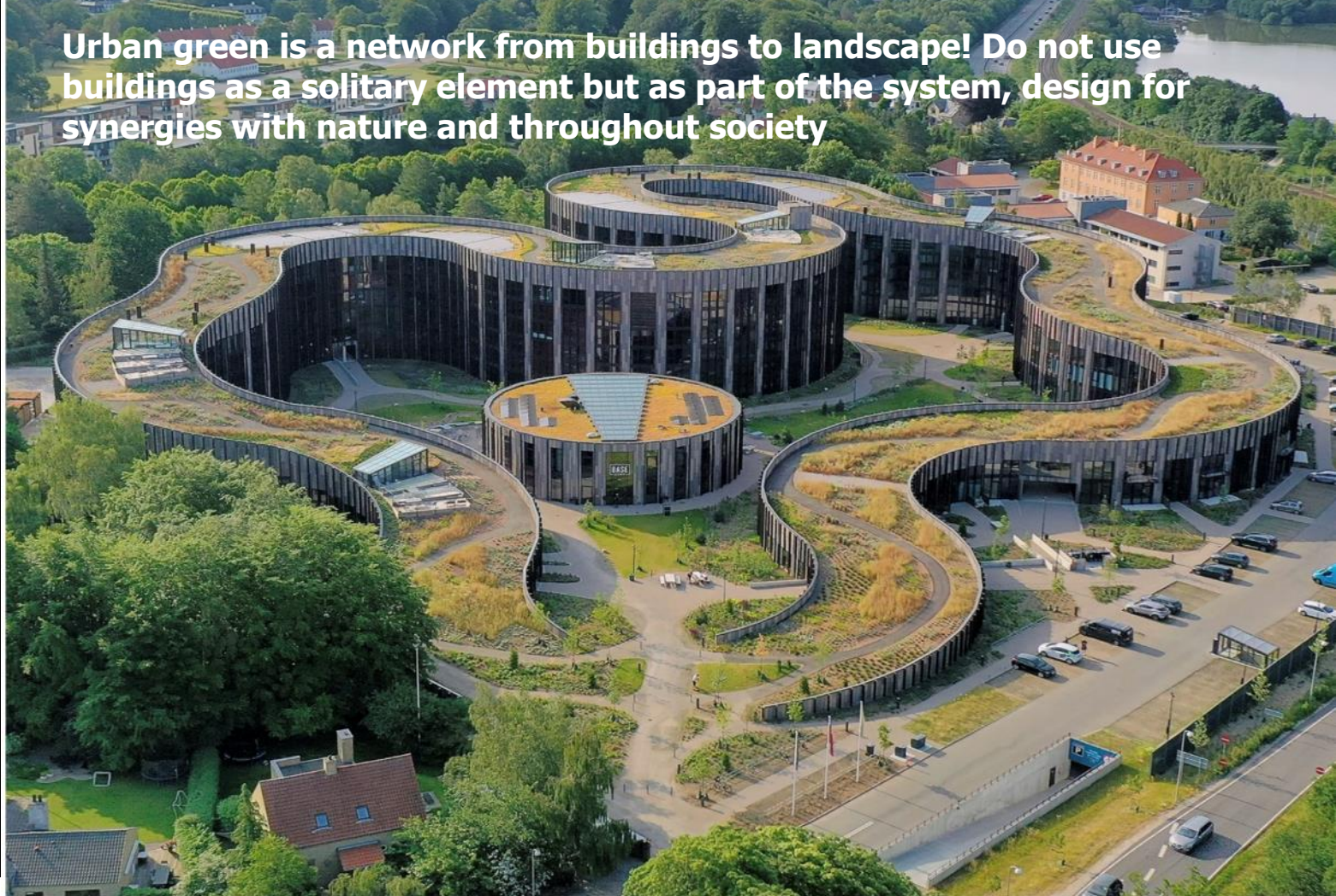




## At neighbourhood level

- Synergy between water purification, storage, heat stress and biodiversity

**Urban green is a network from buildings to landscape! Do not use buildings as a solitary element but as part of the system, design for synergies with nature and throughout society**



# Thank you very much!

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