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Raising Food Awareness Through Architecture

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Drought vs Flood

Illinois, VS

Nepal, India
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19 miljoen hectare regenwoud wordt jaarlijks verloren aan landbouwgrond
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Healthy diets from sustainable food systems

The Lancet

Food systems have the potential to nurture human health and support environmental sustainability; however, they are currently threatening both. Providing a growing global population with healthy diets from sustainable food systems is an immediate challenge. Although global food production of calories has kept pace with population growth, more than 820 million people have insufficient food and many more consume low-quality diets that cause micronutrient deficiencies and contribute to a substantial rise in the incidence of diet-related obesity and diet-related non-communicable diseases, including coronary heart disease, stroke, and diabetes. Unhealthy diets pose a greater risk to morbidity and mortality than does unsafe sex, and alcohol, drug, and tobacco use combined. Because much of the world’s population is inadequately nourished and many environmental systems and processes are pushed beyond safe boundaries by food production, a global transformation of the food system is urgently needed.

A radical change in human diet and a global transformation of the food system is urgently needed to prevent permanent damage to the environment.
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Dutch Housing Graduation Studio’s assignment

How do we want to live in the city of the future and what kind of buildings do we need to allow for that?
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More and more people will live in cities in the near future to live close to their work, university or because of all the facilities in cities.
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In 2050

- It is expected that the world population will grow to 10 billion people by 2050 (now 7.6 billion).

- In Europe it is estimated that 80% of the population will live in cities by that time.

source: (Food and Agriculture Organization of the UN, 2017).
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73% of deforestation can be attributed to agriculture
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In 2050 (Food and Agriculture Organization of the UN, 2017)

- To feed the expected 10 billion of world population, 70% more food need to be produced.

Population growth

More food
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In 2050 (Food and Agriculture Organization of the UN, 2017)

- This is a very difficult to achieve because most available farmland is already being farmed and in ways that decrease its productivity and lead to soil erosion and water wasting.
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- As cities became distance independent, it was no longer necessary to produce food in the close environments.

- Agricultural sites moved outside the city and over time it became possible to even import food from any place in the world.
Today food is developed in a mass globalized system which separated food production from its consumers and therefore the relationship between people and their food is being lost.
- 80% of global trade in food now is controlled by just five multinational corporations which give them the power to completely control the food system.
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Project aims

Reconciling Cities, Peoples and Food

How can the architecture of a residential building create an active way for people to get involved in the food system again?
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Types of urban agriculture

- **Seasonal**
  - Forest gardening

- **Available the whole year**
  - Soil-based cultivation
    - allotment gardens, roof gardens
    - seasonal garden
  - Hydroponics and aquaponics
    - soilless cultivation
    - greenhouse
  - Vertical farming

- **Accessible for everyone**
- **Less accessible**
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Types of urban agriculture

- **Forest gardening**
  - Soil-based cultivation
    - allotment gardens, roof gardens
    - seasonal garden

- **Allotment gardens**: easy accessible for everyone
  - Nowadays the allotments (volkstuinen) are generally located on the edges of cities.
  - There is nowadays a huge demand for allotments which cause a long waiting list for the gardens and especially in Amsterdam.

- **Hydroponics and aquaponics**
  - soilless cultivation
  - greenhouse

- **Vertical farming**
  - accessible for everyone
  - less accessible
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Types of urban agriculture

Seasonal

Forest gardening

Soil-based cultivation
- allotment gardens, roof gardens
seasonal garden

Hydroponics and aquaponics
- soilless cultivation
- greenhouse

Allotment gardens: seasonal garden

Allotment gardens + wintergardens + greenhouse = available the whole year

Vertical farming

available the whole year

accessible for everyone

less accessible
The Belt: formerly held the fortification works that run around the inner city.
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Project location
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History

History: what was there?

a. Bastion Ouderkerk, Molen de Haan
b. Paleis voor Volksvlijt 1864-1929
c. Utrechtse Poort, City Gate
d. Bastion Westerblokhuis, Molen de Groen

Paleis voor Volksvlijt

Built in: 1864
Burned down in: 1929
Function: exhibition hall, later entertainment and shopping-arcade
De Nederlandsche Bank: the bank safe will move to the Zuidas
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The plot

- Green: Public
- Light green: Collective/ private
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Green character

- Horse chestnut
- Acacia
- Hornbeam
- Hawthorn
- Cherry
- Birch
- Oak
- Plane tree
- Ash tree
- Lime tree
- Maple
- Elm
- Alder
- Other species
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Block typologies
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Building heights

- < 12 m (< 4 layers)
- 12 - 15 m (4-5 layers)
- 15 - 21 m (5-7 layers)
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De Nederlandsche Bank
Office 66 meter high
14 layers 56 meter high
4 layers 21 meter high
100 x 150 meter
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Design concept
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Design concept
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Target groups

A residential building for everyone who wants to get involved in the food production through an active way.

Compact studios for singles

City apartment for families

City apartment for couples

A cultivating community through urban agriculture

Food awareness through:

- Food production
- Education/exhibition
- Food-based activities
- Community
- Neighborhood facilities
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Urban plan
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Functions of the building
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Building set-up: section A-A’ 1:300
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Circulation
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Different types of green
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Different types of green

1. Edible garden around the building
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Different types of green

2. Each dwelling has its own wintergarden
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Different types of green

3. Balustrades as vegetable gardens
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Different types of green

4. Planters as vegetable gardens
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Different types of green

5. Inner garden
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Different types of green
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The facades: North facade (city&park) 1:500
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The facades: South facade (Singelgracht) 1:500
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The facades: east facade 1:500
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The facades: west facade 1:500
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Floor plan

Ground floor 1:100
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Floor plan
Ground floor 1:100
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Floorplan: Ground & First floor
Maisonnette 85 m²
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Floor plan: Second & third floor

Maisonnette 77 m²
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Floor plan: Fourth floor

Studio 34 m² & 39 m²
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Floor plan: Fifth & Sixth floor
Apartment 75 m²
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Floor plan: Seventh & Eighth floor
Penthouse 117 m²
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Floor plan: Seventh & Eighth floor
Penthouse 117 m²
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Building structure

Half-sunken basement:
- cast in situ concrete floor and walls
- prefabricated concrete load-bearing walls and beams that support the kanaalplaat floor

From first floor and higher:
- CLT wooden walls 300 mm
- Lignatur wooden floors 300 mm

Ground floor:
- Kanaalplaat floor
- CLT wooden walls

Staircases with elevator

G: Kanaalplaat floor 300 mm
1: CLT wooden wall 300 mm
2: Lignatur wooden floor 300 mm
Staircases with elevator
Structure 1:20
Fragment section & Facade
Loggia beglazing voor plaatsing op een borstwering, type MBR-1A, opgebouwd uit een draaipaneel en schuifdraaipanelen.
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Structure 1:5
detail
Underfloor heating
- conservatory and loggia as a climate buffer, they act as an intermediate zone in which the outdoor climate is tempered in a natural way.
- natural air supply
- mechanical ventilation local-exhaust (kitchen and bath)

Green sedum roofs:
- hold rainfall for longer
- hold against energy waist
- positive effect on air quality

Transparant solar panels to generate electricity

Rainwater harvesting system:
- a pond in the green courtyard with oxygen plants to keep the water bright and clean
- a pump for oxygen supply

Rainwater harvesting system:
- (1) underground tank collects rainwater drained from the roofs through rainwater downpipe, and rainwater from the courtyard through fluted gutters
- the water flows then to the other tanks (2) with water purification system and a pump, that is connected with the washing machine, bath and toilet. This water will also be used for the irrigation of the plants

Greenery in the surrounding and courtyard
- hold rainfall for longer
- positive effect on air quality

Geotherm Energy System (WKO)
- geothermal heating and cooling systems take advantage of the stable temperature underground using a piping system, commonly referred to as a ‘loop’. Water circulates in the loop to exchange heat between the building, the ground source heat pump, and the earth, providing geothermal heating, cooling, and hot water at remarkably high efficiencies.
- Function: heating through underfloor heating, cooling, hot tap water.
- Used energy: electricity
- medium: water

\[3,435 \text{ m}^2 \times 800 \text{mm (average rainfall a year in the Netherland)} \times 0.05 = 137,400 \text{ L (tank capacity)}\]

Average water consumption per person per day for shower/bath + toilet + washing machine + plants = 103.28 L
\[-/ 690 \text{ residents } \times 103.28 = 72,000 \text{ L water a day for all residents}\]

Water tanks in the building: 226,000 L x 3 = 678,000 L
\[(\text{water tanks dimensions: height } 2000 \text{ mm, radius } 6000 \text{ mm})\]

Conclusion: water tanks in the building that collect rain water provide plenty water for the purposes mentioned above.
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Climate: water & green

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- hold rainfall for longer
- hold against energy waste
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Climate: energy, heating & ventilation

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Thank you!

Questions?