AN ECO SYNERGIST HUB IN ROTTERDAM:
Reuse and Regeneration of neglected urban fragments into ecological hotspots
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Landscape Architecture track
RESEARCH PLAN

1st Phase: P1-P2

- Step 1: ANALYSIS 1
  - Mapping
  - Bike excursion
  - Visit of the city: South Area
  - Analysis of Case studies
  - Interviews with experts

- Step 2: THEORETICAL FRAMEWORK
  - Literature (reports, articles, books)
  - 3 main topics:
    - Wastescapes
    - Urban Ecology
    - Harbour/industrial Areas

- Step 3: PROBLEM STATEMENT
  - Challenges: environmental and social

2nd Phase: P2

- Step 4: ANALYSIS 2
  - Mapping
  - Bike excursion
  - Visit of the city: Waalhaven area

- Step 5: RESEARCH QUESTION
  - Analysis of Site Pollution
  - Contact with experts

- Step 6: DESIGN FRAMEWORK
  - Vision for the Project site
  - Set of Design Eco-Components

- Step 7: FINAL DESIGN
  - Design Detailed Area: Oud Charlois

3rd Phase: P2-P3

- Step 3:
- Step 4:
- Step 5:
- Step 6:
- Step 7:

4th Phase: P4-P5

- Step 8:
- Step 9:
- Step 10:

Reformulation of the Research Question

- Step 1:
- Step 2:
- Step 3:
- Step 4:
- Step 5:
- Step 6:
- Step 7:

Inspiration

Do the Project design respond to the research question?

YES

NO

Conclusion

- Finalized definition of the term "Wastescape"
- Principles of the new Eco-design
- Report

Glossary:
- First definition of the term "Wastescape"
- Theoretical derived concepts
RESEARCH PLAN

1st Phase: P1-P2

Step 1: ANALYSIS 1
- Mapping
- Bike excursion
- Visit of the city: South Area
- Analysis of Case studies
- Interviews with experts

Step 2: THEORETICAL FRAMEWORK
- Literature (reports, articles, books)
  - 3 main topics:
    - Wastescapes
    - Urban Ecology
    - Harbour/industrial Areas
- Focus on a large area of intervention: Rotterdam

Glossary:
- First definition of the term “Wastescape”
- Theoretical derived concepts

2nd Phase: P2

Step 3: ANALYSIS 2
- Problem statement
  - Analysis of Site Pollution
  - Contact with experts

3rd Phase: P2-P3

Step 4: RESEARCH QUESTION
- Subquestions

4th Phase: P4-P5

Step 5: DESIGN FRAMEWORK
- Vision for the Project site

Step 6: DESIGN FRAMEWORK
- Set of Design Eco-Components

Step 7: FINAL DESIGN
- Project Recap
- Design Detailed Area: Oud Charles
- Design Detailed Area: Bier Charles

Step 6:
- Finalized definition of the term “Wastescape”

Step 7:
- Principles of the new Eco-design
- Finalized definition of the term “Wastescape”

Conclusion

Do the Project design respond to the research question?
- YES
- NO

3 main topics:
- Wastescapes
- Urban Ecology
- Harbour/industrial Areas

Challenges: environmental and social

Inspiration

3 main topics:
- Wastescapes
- Urban Ecology
- Harbour/industrial Areas

Focus on a medium area of intervention: Waalhaven and surroundings

Focus on a small area of intervention: Oud Charles

Inspiration

Principles of the new Eco-design

Report

Report

Conclusion
INSPIRATION

WASTESCAPES

Schöneberger Südgelände Park, Berlin, Germany
Chausseestraße, Berlin, Germany
“C-mine” Cultural Square, Genk, Belgium
Building complex in the Zhongzheng district of Keelung city in northeastern Taiwan
- Wasteland is not a waste!
- Wastelands beneficial for urban biodiversity
- Wastescapes as means of urban and social regeneration

**WASTESCAPE**

**ECOLOGY**

- Integration of nature in the city is necessary, no more separation.
- Ecosystems should be preserved at any scale
- Rotterdam: future eco-city

**HARBOUR/INDUSTRIAL AREAS**

- Common Qualities and Issues in Harbour/Industrial areas along the water.

**SOIL POLLUTION**

- Techniques of soil remediation and relative usage of plants against pollutants

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**LITERATURE** (Reports, Articles, Books)


- Quodlibet Gilles Clément
  Manifesto del Terzo paesaggio

- Besse, S. K. (2020). From Degradation to Productive Rehabilitation; a cross sectional exploration of a renewable production landscape and bioremediation for the rehabilitation of the contaminat ed industrial site of Shell-Pernis.

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**THEORETICAL FRAMEWORK**
GLOSSARY

- Unintentional Nature
- Fragmented Nature
- Abandoned Nature
- Brownfield/Greenfield
- Cyclical Nature
- Disordered Nature
- Invisible Nature
- "Terrain Vague"
- Valueless Nature
- Ambiguous Nature
- Non place
- Empty place
- Dangerous place
- Wild Nature
- Mysterious Nature
- Forgotten Nature
- Marginal Nature
- Neglected Nature
- Invisible Nature
- Regenerative Nature
- Fragmented Nature
- ‘Post Romanticism’ Nature
- Forgotten Nature
- Neglected Nature
- Invisble Nature
- WASTESCAPE
A WASTESCAPE is:

- a space of social and environmental regeneration. It can help to overcome the divisions between people and to improve the quality of species’ life. Its appearance and function are continuously changeable according to different times and places.

- a ‘Non-place’ of passage where there is no local identity to recognize. Its nature is invisible and apparently worthless to citizens.

- a place where nature, with its wild and disordered aspect, takes on a charm of its own, mysterious, ambiguous due to its indefinite form and function.

- a space lacking of own identity, recognizable social, spatial and cultural features by a community.
CHALLENGES IN ROTTERDAM

- Division between North and South sides
- Pressing urbanization
- Urban (social/spatial) fragmentations
- Environmental pollution: soil, water, air
Step 1: ANALYSIS 1
- Mapping
- Bike excursion South (Maashaven)
- Analysis of Case studies
- Interviews with experts

Step 2: THEORETICAL FRAMEWORK
- Literature (reports, articles, books)
- 3 main topics:
  - Wastescapes
  - Urban Ecology
  - Harbour/industrial Areas

Step 3: PROBLEM STATEMENT
- Challenges: environmental and social

Step 4:
- Mapping
- Bike excursion: Visit of the city: Waalhaven area
- Analysis of Site Pollution
- Contact with experts

Step 5: ANALYSIS 2
- RESEARCH QUESTION
- Set of Design Eco-Components

Step 6: DESIGN FRAMEWORK
- Vision for the Project site
- Design Detailed Area: Oud Charlois

Step 7: FINAL DESIGN
- Set of Design Detailed Area: Oud Charlois
- Project Re-cap

Focus on a large area of intervention: Rotterdam
Focus on a medium area of intervention: Waalhaven and surroundings
Focus on a small area of intervention: Oud Charlois

Inspiration

Glossary:
- First definition of the term "Wastescape"
- Theoretical derived concepts

Conclusion

YES

NO

Do the Project design respond to the research question?

Principles of the new Eco-design
Finalized definition of the term "Wastescape"

Report
Report

Reformulation of the Research Question

Focus on a large area of intervention: Rotterdam
Focus on a medium area of intervention: Waalhaven and surroundings
Focus on a small area of intervention: Oud Charlois

1st Phase: P1-P2

2nd Phase: P2

3rd Phase: P2-P3

4th Phase: P4-P5
What is the future of the Wastescapes in the city of Rotterdam?

Due to an economic process of “urban pressure” undergoing in the city, the majority of the old industrial, harbour areas or buildings are demolished and replaced by new structures with different functions and forms ‘erasing’ the memory of the past urban structures. Some lands instead are used and then abandoned or even never used and left uncultivated. These, usually covered by wild vegetation, can host a high range of biodiversity, especially in not polluted soils.
ANALYSIS: REGIONAL → CITY → DISTRICT
Abandoned spaces and Green areas

- Combination of wasted areas and vegetation in and around the city of Rotterdam.
ANALYSIS : REGIONAL > CITY > DISTRICT

Green areas and Soil pollution

- Soil quality in/around the city of Rotterdam varies considerably. Some areas have a high rate of pollution, while others a lower one.
ANALYSIS : REGIONAL > CITY > DISTRICT

Potential Green Connections (“Green Sewing Corridors”) through industrial areas.
- Potential ecological corridors can be created or other existing ones to be strengthened.
- A central vertical one is for **BIRD MIGRATION**, while the horizontal one is important for **FISH MIGRATION**.
ANALYSIS: REGIONAL > CITY > DISTRICT

Individuation of Four Critical Points

- Due to the central industrial zones, four important points along the Maas river show a discontinuity of green areas between North and South. The presence of such industrial areas also hinders the accessibility to the river from the city.
ANALYSIS : REGIONAL > CITY > DISTRICT

Industrial Areas converted into New Eco-Hotspots

- The transformation of industrial critical areas into new ecological hotspots leads to the increase of urban vegetation (biodiversity), the depollution of the soil, water and air.
ANALYSIS : REGIONAL > CITY > DISTRICT

Selection of a critical area of interest. Large Scale.

- The chosen area of intervention represents a crucial crossing point where the contrast between city and harbour/industry is much stronger and more evident.
ANALYSIS: REGIONAL > CITY > DISTRICT

Area of Intervention: Waalhaven and surroundings. Medium scale.

- The area is going to host a future increase of population, building densification and green urbanization.
ANALYSIS : REGIONAL>CITY>DISTRICT

Area of intervention: Waalhaven and surroundings. Connections.

- The presence of a Vertical/Horizontal Green Connection in the area fosters the mobility along the water and the improvement of relation between North and South.
ANALYSIS : REGIONAL>CITY>DISTRICT
Area of intervention: Waalhaven and surroundings. Small Scale.
- Current Plan of Urban Intervention and reconnection between the city and the port: “Plan StadsHaven”.
ANALYSIS: OVERVIEW ROTTERDAM - NATURAL / URBAN / ENVIRONMENTAL LAYERS

- BLUE STRUCTURE
- GREEN STRUCTURE
- CONTOUR AREA
- BASE MAP
- NATURE
- MOBILITY
- BUILDINGS (CONSTRUCTION YEAR)
- CONTOUR AREA
- BASE MAP
- URBAN
- AIR POLLUTION
- SOIL POLLUTION
- NOISE POLLUTION
- CONTOUR AREA
- BASE MAP
- ENVIRONMENT
The analysis of the city of Rotterdam and its surrounding region under multiple aspects led to the following **STATEMENTS**:

- **Highest levels of pollution** along the main communication routes: the Maas (Water) river or the highways (Air, Noise).

- The **quality of the urban space** varies according to the location:
  - Near the port: scarce vegetation and fragmented urban agglomerations.
  - Inner-city: green and built areas more dense and aggregated.

- The **relationship between the density of industrial and building areas** is inversely proportional: in the city center there are fewer industrial areas, and vice versa.
WAALHAVEN AREA
A GRADUAL FRACTURE OVER TIME BETWEEN THE PORT AND THE CITY

- Containerization and technological revolution in second half of 20th century: important breakthrough for the port. Port and city drifted apart, and huge areas were left behind for new urban uses.
Plan Stadhavens, contextualized on a regional scale.

Stadshavens: extensive area consisting of Merwehaven and Vierhaven, Rijn- and Maashaven, RDM site and Heijsehaven and Waal- and Eemhaven.

Plan Goal: - Increase in scale and relocations of port companies create space for new functions.
- Coexistence of different stakeholders: Port of Rotterdam, Business Companies and Citizens.

Plan Stadhavens and its links to the surrounding urban areas.

Sub-areas belonging to Plan Stadhavens.
Increase of population in the South of Rotterdam by 2040.

Future Urban Traffic Plan. Improvement of connection between Northern and Southern sides of the city.

Plan of Future Green Urbanization in Rotterdam.

- **50,000 new houses** or more will be needed in open and green areas within the ring road.

- **East side:** 22,000 homes.

- **Other side of the Maas:** 10,000 homes.

- **West side of the city:** 5000 homes, including a new metro station ‘Spangen’.

Regarding urban mobility, the car will be less central and there will be more space for cyclists, pedestrians and green spaces.

Increase of population in the South of Rotterdam by 2040.
ANALYSIS: OVERVIEW PROJECT AREA - NATURAL / URBAN / ENVIRONMENTAL LAYERS

- BASE MAP
- CONTOUR AREA
- BLUE STRUCTURE
- GREEN STRUCTURE
- SITE SPECIES
- HABITATS OF INTEREST
- WASTESCAPES (LANDS, BUILDINGS, RAILWAYS)
- ACCESSIBILITY VIEWPOINTS
- MOBILITY
- BUILDINGS (CONSTRUCTION YEAR)
- BUILDINGS (TYPOLOGIES)
- LAND USE
- VIEWPOINTS
- MOBILITY
- WIND DIRECTION
- SOIL POLLUTION
- CONTOUR AREA
- ENVIRONMENT
The analysis of the city of Waalhaven area and its surroundings under multiple aspects led to the following **STATEMENTS**:

- The **quality of the urban space** varies according to the land use. 
  Near the port: fragmented Vegetation and Biodiversity, concentrated in some punctual areas. Some of them are easily accessible, others not.

- The most urbanized areas in and around Waalhaven present **high concentrations of mapped species** due to the presence of built structures (shelter).

- Due to a strong urbanization, the **presence of historical port structures** is almost nil. In fact, most of them have been replaced by other, more advanced and modern structures.
WASTESCAPES AROUND WAALHAVEN AREA

Legend

- Forests
- Land without current use
- Mineral extraction and dump sites
- landscape_greenfield
- railway_construction
- landscape_landfill
- landscape_brownfield
- railway_dilapidated
- railway_abandoned
- gis_osm_water_a_free_1
- gis_osm_waterways_free_1
- gis_osm_roads_free_1
WASTESCAPES IN WAALHAVEN AREA

Legend
- Disused Railway
- Abandoned Railway
- Land with no Use

Land with no use

0 km
1 km
2 km
WASTESCAPES AND SOIL POLLUTION AROUND WAALHAVEN AREA

Legend

NL003L3_ROTTERDAM_UA2018_v012
NL003L3_ROTTERDAM_UA2018_v012 NL003L3_ROTTERDAM_UA2018
- Forests
- Land without current use
- Mineral extraction and dump sites
- landuse_greenfield
- railway_construction
- landuse_landfill
- landuse_brownfield
- railway_disused
- railway_abandoned
- gis_osm_water_areas_free_1
- gis_osm_waterways_free_1
NL003L3_ROTTERDAM_UA2018_STL_v012
NL003L3_ROTTERDAM_UA2018_STL_v012 NL003L3_ROTTERDAM_UA2018_STL
- gis_osm_roads_free_1

SOIL QUALITY

- Nature (Clean)
- Agriculture (Very lightly contaminated)
- Living (Lightly contaminated)
- Industry (Moderately contaminated)
- Remnant Areas (Strongly contaminated)
SOIL POLLUTION IN THE PROJECT AREA

Legend-Soil Quality
- Nature (Clean)
- Agriculture (Very lightly contaminated)
- Living (Lightly contaminated)
- Industry (Moderately contaminated)
- Remnant Areas (Strongly contaminated)

Legend-Pollutants
- Cd (Cadmium)
- Pb (Lead)
- As (Arsenic)
- Ba (Barium)
- Zn (Zinc)
- Cu (Copper)
- Ni (Nickel)
- Co (Cobalt)
- PAH's (Polycyclic Aromatic Hydrocarbons)
- Hg (Mercury)
- Mineral Oil (various)
SPATIAL QUALITY IN THE WAALHAVEN AREA

Legend
- Bike-Walk-Car
- Walk
- Parks
- Low Vegetation

Isolated Community Pernis
Isolated Community Oud Charlois
Isolated Community Heijplaat

Land with no use
Highly dense commercial area
Biodiversity in the Waalhaven Area
SPECIES AND THEIR RELATED HABITAT
TYPOLOGIES OF GRADIENT

Typology 1

GRASSLAND  SHRUBLAND  FOREST  SHRUBLAND  GRASSLAND

Typology 2

FOREST  SHRUBLAND  WETLAND

MARGINAL  EMERGENT  SUBMERGENT  FLOAT. LEAVED
SELECTED SPECIES (FLORA/FAUNA) IN WAALHAVEN AREA

Legend

**FLORA** - Plants against pollution, tolerant to wind, idoneous for sandy/loamy soils

**Forest:**
1. Quercus Robur
2. Salix Nigra
3. Populus x canescens

**Shrubland:**
4. Taxus baccata
5. Crataegus monogyna
6. Berberis vulgaris
7. Amelanchier rotundifolia
8. Rosa canina
9. Salix nigra

**Grassland:**
10. Helianthus rigidus
11. Brassica Juncea
12. Typha angustifolia
13. Phragmites australis
14. Lythrum salicaria
15. Hypericum calycinum
16. Phalaris arundinacea
17. Chrysopogon zizanioides

**Wetland:**
(Underwater plants)
18. Ranunculus aquatilis
19. Hydrocotyle palustris
20. Callitriche palustris
21. Elodea canadensis

(Plants with floating leaves)
22. Eichhornia crassipes
23. Petanum natans
24. Polygonum amphibium
25. Phragmites australis

(Floating plants)
26. Stratiotes aloides
27. Ceratophyllum demersum

**FAUNA** - Target species (endangered)
29. Rabbit - Oryctolagus cuniculus
30. EU Eel - Anguilla anguilla
31. Bone - Platichthys flesus
32. Carp - Cyprinus carpio
33. Common Coot - Fulica atra
34. Meadow Pipit - Anthus pratensis
35. Bumble bee - Bombus
36. Redwing - Turdus iliacus
37. Noctule bat - Nyctalus noctula

FAUNA - Target species (endangered)
TYPOLOGIES OF GRADIENT WITH SOME SELECTED SPECIES

GRASSLAND  SHRUBLAND  FOREST  SHRUBLAND  GRASSLAND

TYPOLOGY 1

FOREST  SHRUBLAND

WETLAND

MARSH

TYPOLOGY 2

1  2  37  29
29  37  2  1
25  35  36  34
34  35  29  29
35  35  36  34
25  30  33  32
POTENTIAL OF A VEGETATION GRADIENT IN A CITY

INCREASE OF BIODIVERSITY

ENVIRONMENTAL PURIFICATION

FILLING OF EMPTY SPACES
**RESEARCH PLAN**

**Step 1: ANALYSIS 1**
- Mapping
- Bike excursion
- South Area (Maashaven)
- Analysis of Case studies
- Interviews with experts

**Step 2: THEORETICAL FRAMEWORK**
- Literature (reports, articles, books)
  - 3 main topics:
    - Wastescapes
    - Urban Ecology
    - Harbour/industrial Areas
- Challenges:
  - Environmental and social

**Step 3: PROBLEM STATEMENT**
- Analysis of Site Pollution
- Interviews with experts
- Bike excursion
- South Area (Maashaven)
- Waalhaven area

**Step 4: ANALYSIS 2**
- Subquestions
- Focus on a medium area of intervention:
  - Waalhaven and surroundings

**Step 5: DESIGN FRAMEWORK**
- Vision for the Project site
- Set of Design Eco-Components

**Step 6: DESIGN FRAMEWORK**
- Finalized definition of the term "Wastescape"

**Step 7: FINAL DESIGN**
- Principles of the new Eco-design
- Report

**1st Phase: P1-P2**
- Inspiration
- Finalized definition of the term "Wastescape"
- Theoretical derived concepts

**2nd Phase: P2**
- Step 2: THEORETICAL FRAMEWORK
- Step 3: PROBLEM STATEMENT
- Step 4: ANALYSIS 2

**3rd Phase: P2-P3**
- Step 5: DESIGN FRAMEWORK
- Step 6: DESIGN FRAMEWORK
- Step 7: FINAL DESIGN

**4th Phase: P4-P5**
- Finalized definition of the term "Wastescape"
- Principles of the new Eco-design
- Report
What spatial framework can guide the transition of Wastescapes in Rotterdam into ecological valuable spaces which can foster biodiversity, and improve the quality of people and species’ life aspects on small, medium or large scale?

- Which exact kind of Wastescapes can be considered within the design framework?

- What particular reuse of “Wastescapes” can represent the best, efficient, sustainable and flexible eco-solutions against climate change, urban fragmentation and loss of biodiversity?

- Which green design solution can help to overcome the urban and social fragmentations of the southern districts of the city?

- How can the wastescapes and the existing green areas be combined in order to create new ecological corridors at large scale?

- Which is the best ecological way to depollute the Brownfields improving the quality of the soil, increasing the biodiversity in the city?

- How can certain techniques of Phytoremediation be applied on certain gradients in order to tackle environmental and social issues in the project area?
DESIGN FRAMEWORK

CHALLENGES

- Increase of green, people and houses
- Environmental pollution: soil, water, air
- Urban, social fragmentation
- Low socialization

QUALITIES

- Historical sites
- Variety of habitats and species
- Valuable green areas

DESIGN PRINCIPLES

- Increase of urban biodiversity
- Sustainability
- Circularity of spatial reuse
- Phytoremediation
- Improvement of water quality
- Air cooling
- Flexibility
- Easy accessibility
- More socialization
SOIL MAP WITH SITE INTERVENTIONS BY DESIGN ECO-COMPONENTS

Legend
- Nature (Clean)
- Agriculture (Very lightly contaminated)
- Living (Lightly contaminated)
- Industry (Moderately contaminated)
- Remnant Areas (Strongly contaminated)
- Viewpoints
  - Main connections
  - Secondary connections
- Parks
- Low vegetation (Grass, Shrubs)

1- Highway Bridge -> Ecoduct
2- Abandoned, disused railway -> Green Boardwalk
3.1- Brownfield -> Community garden (by Soil Remediation)
3.2- Brownfield -> Urban Park (by Soil Remediation)
4- Reuse industrial Heritage (ex. structures) -> Urban Park
5- Land with no use -> Urban Park with Recreational areas
6- Neglected River banks -> Sitting areas
7- Harbour buildings -> Green Roof/Walls
DESIGN ECO-INTERVENTIONS ON SITE - WAALHAVEN AREA

Legend
1-Highway Bridge -> Ecoduct
2-Abandoned, disused railway -> Green Boardwalk
3.1-Brownfield -> Community garden (via Soil Remediation)
3.2-Brownfield -> Urban Park (via Soil Remediation)
4-Reuse industrial Heritage (existing structures) -> Urban Park
5-Land with no use -> Urban Park with Sitting, Recreational areas
6-Neglected River banks -> Sitting areas along the water
7-Reuse harbour buildings -> Eco Retrofit: Green Roof/Walls
The interventions located in areas subject to phytoremediation may undergo some variations in duration.

*The interventions located in areas subject to phytoremediation may undergo some variations in duration.*
12 Urban Quality Criteria by Gehl Architects: Selection

**Protection**
- Protection against traffic & accidents
- Protection against unpleasant sensory experiences

**Comfort**
- Opportunities to walk/cycle
- Opportunities to stop & stay
- Opportunities to sit
- Opportunities to see
- Opportunities to play & exercise

**Enjoyment**
- Dimensioned at human scale
- Opportunities to enjoy the positive aspects of climate
- Aesthetic qualities + positive sensory experience
MASTERPLAN (CURRENT SITUATION) - WAALHAVEN AREA

Legend

- Bike-Cars-People
- Bike-Cars
- Parks (Trees)
- Low Vegetation
- Residential areas
- Industrial Buildings
How can certain techniques of Phytoremediation be applied on certain gradients in order to tackle environmental and social issues in the project area?

**PHYTOREMEDIATION:**
SELECTED 5 TECHNIQUES TO TACKLE (SOIL/AIR/WATER) POLLUTION

**Typologies of gradient with some selected species**

- **Typology 1**
  - Grassland
  - Shrubland
  - Forest
  - Shrubland
  - Grassland

- **Typology 2**
  - Forest
  - Shrubland

One year """"DURATION"""" Several Decades
INTERVENTIONS ON SITE WITH GRADIENTS/PHYTOREMEDIATION - SITE 1

CHOSEN TECHNIQUES: according to the type of Pollutants and the related purifying Plants
- Phytoextraction
- Rhizofiltration

SECTIONS OF INTERVENTIONS: COMBINATION: GRADIENT/PHYTOREMEDIATION (BY 20 YEARS)

Legend - Soil Quality
- Clean
- Very lightly contaminated
- Lightly contaminated
- Moderately contaminated
- Strongly contaminated

Legend - Pollutants
- Cd
- Pb
- As
- Ba
- Zn
- Cu
- Ni
- Co
- PAH’s
- Hg
- Mineral Oil (various)
- Clay
- Peat
- Sand

Before

After

Moderately contaminated

Lightly contaminated
INTERVENTIONS ON SITE WITH GRADIENTS/PHYTOREMEDIATION - SITE 2

CHOOSE TECHNIQUES: according to the type of Pollutants and the related purifying Plants
- Phytodegradation
- Phytostabilization

SECTIONS OF INTERVENTIONS: COMBINATION: GRADIENT/PHYTOREMEDIATION (BY 20 YEARS)

Legend - Soil Quality
- Clean
- Very lightly contaminated
- Lightly contaminated
- Moderately contaminated
- Strongly contaminated

Legend - Pollutants
- Cd
- Pb
- As
- Ba
- Zn
- Ni
- Cu
- Co
- PAH's
- Hg
- Mineral Oil (various)

Legend
- Cars
- Bike-People
- Trees
- Low Vegetation
- Phytoremediation fields
- River Plants
- Industrial Buildings

Before

After
RESEARCH PLAN

Step 1: ANALYSIS 1
- Mapping
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  - 2 main topics:
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  - Harbour/industrial Areas

Step 3: PROBLEM STATEMENT
- Challenges: environmental and social

Step 4: ANALYSIS 2
- Mapping
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- Analysis of Site Pollution
- Contact with experts

Step 5: RESEARCH QUESTION
- Subquestions

Step 6: DESIGN FRAMEWORK
- Vision for the Project site
- Set of Design Eco-Components

Step 7: FINAL DESIGN
- Design Detailed Area: Oud Charlois
- Project Re-cap

Reformulation of the Research Question
- Do the Project design respond to the research question?
  - YES
  - NO

Conclusion
- Finalized definition of the term "Wastescape"

Inspiration
- Focus on a large area of intervention: Rotterdam
- Focus on a medium area of intervention: Waalhaven and surroundings
- Focus on a small area of intervention: Oud Charlois

Glossary:
- First definition of the term "Wastescape"
- Theoretical derived concepts

Principles of the new Eco-design

Report
OUD CHARLOIS - CURRENT SITUATION - INTERVENTION

- REMOVAL OF OBSTRUCTING BUILDINGS

Legend

- Bike - Cars - People
- Bike-Cars
- Parks (Trees)
- Low Vegetation (Grass, Shrubs)
- Removed Industrial Buildings
- Industrial Buildings
- Unused Spaces
- Views
DUD CHARLOIS - PROPOSAL (BY 20 YEARS)

- Transformation of remaining buildings into eco-structures

Legend

- Cars
- Bike-People
- Trees (Quercus Robur, Salix Nigra, Populus x Canescens)
- Low Vegetation (Grass, Shrubs)
- Phytoremediation fields
- River Plants (Phragmites australis)
- Floating plants (Stratiotes aloides, Ceratophyllum demersum, Eichhornia crassipes)
- Green Roof/Wall
- Water Storage
- Rainwater
- Purified water (Clean)
- Inlet
- Outlet
- Ind./Res. Buildings

Scale: 0 100 m 200 m
DESIGN ECO-INTERVENTIONS ON SITE - OUD CHARLOIS

Legend
1-Highway Bridge > Ecoduct
2-Abandoned, disused railway - > Green Boardwalk
3.1-Brownfield -> Community garden (via Soil Remediation)
3.2-Brownfield -> Urban Park (via Soil Remediation)
4-Reuse industrial Heritage (existing structures) - > Urban Park
5-Land with no use -> Urban Park with Sitting, Recreational areas
6-Neglected River banks -> Sitting areas along the water
7-Reuse harbour buildings -> Eco Retrofit: Green Roof/Walls
The interventions located in areas subject to phytoremediation may undergo some variations in duration.
HUMAN ACTIVITIES ON SITE - OUD CHARLOIS

Legend
- Walking
- Sitting
- Running
- Cycling
- Driving
- Birdwatching
CURRENT SITUATION

Legend
- Bike - Cars - People
- Bike-Cars
- Parks (Trees)
- Low Vegetation (Grass, Shrubs)
- Industrial Buildings

SECTION A-A'

SECTION B-B'

SECTION C-C'
PROPOSAL (BY 20 YEARS)

Legend
- Cars
- Bike-People
- Trees
- Low Vegetation (Grass, Shrubs)
- Phytoremediation fields
- River Plants
- Floating plants (purifying)
- Green Roof/Wall
- Water Storage
- Ind. /Res. Buildings

SECTION A-A’

SECTION B-B’

SECTION C-C’
SECTION B-B’: DESIGN DETAILS

1. GREEN WALL
2. GREEN ROOF
3. ECO- RIVER BANK
4. WATER BOARDWALK
5. FAUNA PASSAGE

* Source images 3,5: “Twenty ideas for integrating biodiversity in urban planning and development”, Gemeente Amsterdam
4: https://greatriversgreenway.org/design-guidelines/trail-design/boardwalk/
DEVELOPMENTS:
- Increase of Purifying plants (River Banks, Floating Gardens, Slope)
- Increase of Green Roof Structures
- Transformation of Green Roof/Wall Buildings into Water Storage areas or vice versa

Legend
- Cars
- Bike-People
- Trees (Quercus Robur, Salix Nigra, Populus x Canescens)
- Low Vegetation (Grass, Shrubs)
- Phytoremediation fields
- River Plants (Phragmites australis)
- Floating plants (Stratiotes aloides, Ceratophyllum demersum, Eichhornia crassipes)
- Green Roof/Wall Water Storage
- Rainwater Purified water (Clean)
- Inlet Outlet
- Ind. /Res. Buildings
**OUD CHARLOIS - PROPOSAL (BY 60 YEARS)**

**DEVELOPMENTS:**
- Increase of Purifying plants (River Banks, Floating Gardens)
- Increase of Green Roof Structures and Water Storage pools
- Removal of a few buildings and conversion of other ones into Green Roof/Wall Structures

**Legend**
- Cars
- Bike-People
- Trees (Quercus Robur, Salix Nigra, Populus x Canescens)
- Low Vegetation (Grass, Shrubs)
- Phytoremediation fields
- River Plants (Phragmites australis)
- Floating plants (Stratiotes aloides, Ceratophyllum demersum, Eichhornia crassipes)
- Green Roof/Wall
- Water Storage
- Rainwater → Purified water (Clean)
- Inlet
- Outlet
- Ind. /Res. Buildings
OUD CHARLOIS - BIRD VIEW (BY 20 YEARS)

- OUD CHARLOIS Houses
- Green Roof
- Water Storage
- Water taxi stop > Eco River Bank
- Harbour Dock > Floating Gardens
- Unused Railway > Boardwalk
- Water taxi stop > Eco River Bank
FOUR CRITICAL AREAS - FEATURES

1. - Dunal Landscape
   - Absence of Living areas
   - Main Prevalence of Industrial settlements

2. - Urban Landscape
   - Still Prevalence of Industrial areas
   - Presence of a few Living areas

3. - Rural Landscape
   - Balance of Living and Industrial Areas
   - Minor presence of Industrial areas
The comparison of the four critical areas identified in Rotterdam led to the formulation of the following statements:

- Different physical conditions and area extensions require some solutions instead of others. It is not possible to apply all the design solutions in any of the other 3 areas.
- The area number 2 can be a subsequent intervention area after that of Waalhaven, given the need for more design interventions.
- The areas 1 and 3 they seem to require fewer design interventions, perhaps others different from those introduced in Waalhaven.
Due to an economic process of “urban pressure”, the majority of the old industrial, harbour areas, buildings are demolished and replaced by new structures with different functions, forms ‘erasing’ the memory of the past urban structures. Some lands instead are used and then abandoned or even never used and left untouched.

- SELECTION OF AN AREA OF INTERVENTION (FROM LARGE SCALE TO MEDIUM ONE)

- FORMULATION OF PROBLEM STATEMENT AND RESEARCH QUESTION
What spatial framework can guide the transition of Wastescapes in Rotterdam into ecological valuable spaces which can foster biodiversity, and improve the quality of people and species’ life aspects on small, medium or large scale?

- SELECTION OF AN AREA OF INTERVENTION (FROM MEDIUM SCALE TO SMALL ONE)
- FORMULATION OF A CONCEPT + DESIGN FRAMERWORK
PROJECT RE-CAP

- PRACTICAL APPLICATION OF THE DESIGN FRAMERWORK

- PROJECT DEVELOPMENT + CONCLUSION (ANSWER TO RESEARCH QUESTION)
- Encouraging the citizens of Rotterdam to start appreciating and giving importance to the abandoned spaces and structures in the city.

- The reuse and regeneration of wasted places can offer great potential for urban biodiversity and also for the improvement of socialization.

- The sense of belonging to a place is fundamental and it can be discovered again via urban landscape design. A space can represent a place of experience and a point of integration and be perceived with its own identity.

- Resilient, circular, sustainable, regenerative system that show the potential of the Wastescapes, flexible urban elements to promote biodiversity, addressing climate change, ease urban fragmentations, improve species and citizens’ quality of life over time.
TRANSFORMATION OF A WASTESCAPE (BEFORE) - OUD CHARLOIS
TRANSFORMATION OF A WASTESCAPE (AFTER) - OUD CHARLOIS