FLUX WATERSCAPES

The transformation of south Bratislava as part of the waterscape of the Danube

Graduation studio: Flowscapes / Landscape Architecture / The faculty of Architecture / TU Delft
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My fascination is the ideal relationship among the waterscapes, city development and city livability.
Bratislava
The world closest two capital cities

SITE CHOOSE
Twin-city region
PROBLEM STATEMENT
Higher possible of floods and more water discharge
PROBLEM STATEMENT
URBAN ASPECT PROBLEM

New Post-socialist City

Bratislava

Petržalka New Post-socialist City
Low quality and maintain
Low quality and maintain of Public spaces and services
Low quality and maintain of Public spaces and services
Unused and empty public green spaces
Highway as a split line cutting the north and south city.

The quality of living environment of both areas has a huge difference.
The quality of living environment of both areas has huge difference.
How can we use landscape approaches that based on using water system of Danube as dynamic model and cultural icon, and considering the processes of natural and social change, then integrating different subjects such as ecology, history, social and agriculture to make a new water landscape design for the right bank city of Bratislava, thereby mitigating water problems and making effective contribution to city development and livability?
## RESEARCH DESIGN METHODOLOGY

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1. Natural aspects
2. City development history
3. Social aspects
SITE ANALYSIS

1. Natural aspects
   - ELEVATION

2. City development history
3. Social aspects

4. Research design methodology
   - Region study
   - Design theory
   - Design principles
   - Case study

1. Fascination
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1. First idea of design intervention
2. Possibilities

1. Three scale
2. Next step and focus

HUNGARY
Slovakia
Slovakia
Austria

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13
River Alluvial Fan

The right bank is a fluvial fan of the Danube. Most parts are sandy. Some parts are gravel from Holocene and Pleistocene. Holocene-Pleistocene

- Holocene:
  - anthropogenic sediments: Infill
  - mostly flood sediments, mienial moors
  - mostly sand, fine to medium-grained sands
  - predominantly fine-grained clayey sands
  - silty clays, humus replies to abandoned meanders
  - loamy, salivary humic sediments, fills meanders
  - Mud and sitatino-peatland fill in dead branches and meanders
  - proluvial sediments: alluvial cone-spatula mostly loam, sandy loam, fragments of rocks, boulders suborder
  - Organic sediments: peat

- Holocene-Pleistocene:
  - fluvial sendiments, wurm-holocene: sandy gravel, gravel

- Pleistocene:
  - fluvial sendiments: wurm: spatula, sandy gravel, gravel

SITE ANALYSIS - GEOMORPHOLOGY

Natural aspects - Geomorphology

Petržalka
River Alluvial Fan

Holocene
1. Anthropogenic sediments, inclined
2. Mostly flood sediments, marshy moors
3. Mostly sand, fine to medium-grained sands
4. Predominantly fine-grained clayey sands
5. Silty clays, humus relicts to abandoned meanders
6. Loamy, salivary humic sediments, fills meanders
7. Mud and silt peatland fill in dead branches and meanders
8. Proluvial sediments: alluvial cone-spatula mostly loam, sandy loam, fragments of rocks, boulders suborder
9. Organic sediments: peat

Holocene-Pleistocene
12. Fluvial sediments, wurm-holocene: sandy gravel, gravel

Pleistocene
14. Fluvial sediments: wurm: spatula, sandy gravel, gravel
The right bank is a fluvial fan of Danube. Most parts are sandy. Some parts are gravel from Holocene and Pleistocene.
SITE ANALYSIS

Natural aspects - Agriculture

Calcic Chernozem Soil
Good for agriculture
SITE ANALYSIS
Social aspects - city development history

- Before 18 century
- Between 18-19 century
- After 19 century
- Future

?
Before 18 century
Over a period of almost three centuries, 11 Hungarian kings and 8 royal wives are crowned in Bratislava.

1809
The town is besieged by Napoleon’s troops

1919
January 1 – Bratislava is occupied by the Czechoslovak Legions and becomes part of the new Czechoslovak Republic

1948
February 25 – After a political coup, the Communist Party takes power in Czechoslovakia; all executive power in the town and across the country is assumed by communists

1993
Bratislava becomes the capital of the independent Slovak Republic

1st century BC
Celts build fortified settlements at Devin and Bratislava, and establish a Celtic mint, where silver coins known as ‘biatecs’ are produced.

1st – 4th centuries AD
The country south of the River Danube comes under the rule of the Roman Empire

Bratislava developed slowly on the north bank of Danube. Lots of small village located on the higher area of the south bank of Danube.

Before 18 century
Developed on left bank of Danube

Between 18-19 century
Small Developing intervention on right bank of Danube

After 19 century
Huge development on right bank of Danube

People settled and built a small village at right bank of Bratislava and enjoy the waterfront life there.

The right bank of Bratislava developed faster than any ages. The biggest socialist residential area was built by draining the alluvial fan of right bank of Danube. The floods risk becomes more serious at both bank and other water problems followed.

Bratislava city development

Harmony and uncontrolled

Less development and control

Control and risks
Left river arms and green spaces

Left Forest and heritage

Gerulata Rusovce Roman Ruins
Between 18-19 century
Over a period of almost three centuries, 11 Hungarian kings and 8 royal wives are crowned in Bratislava.

Before 18th century
Developed on left bank of Danube
Harmony and uncontrolled

People settled and built a small village at right bank of Bratislava and enjoy the waterfront life there.

Between 18th-19th century
Small Developing intervention on right bank of Danube
Less development and control

The right bank of Bratislava developed faster than any ages. The biggest socialist residential area was built by draining the alluvial fan of right bank of Danube. The floods risk becomes more serious at both bank and other water problems followed.

After 19th century
Huge development on right bank of Danube
Control and risks
Left bank of Danube
Old Bratislava

Right bank of Danube
New Bratislava
Left bank of Danube
Old Bratislava

DANUBE
Fantastic view of old city center

Right bank of Danube
small village
Residents enjoy the life close to waterfront.
Vojenske Cintorin – A World War 1 Cemetery

Two bunkers record the history of War time.
Bratislava city development

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Harmony and uncontrolled

People settled and built a small village at right bank of Bratislava and enjoy the waterfront life there.

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Small Developing intervention on right bank of Danube

Less development and control

The right bank of Bratislava developed faster than any ages. The biggest socialist residential area was built by draining the alluvial fan of right bank of Danube. The floods risk becomes more serious at both bank and other water problems followed.

After 19 century
Huge development on right bank of Danube

Control and risks
Post-socialist City

20 Century

Productive residential area

HUGE RESIDENTIAL AREA

3.13 Interior of a panelák
3.14 Old people in Petržalka
3.15 Panelák
New vision of right bank of Bratislava
EU Member, No city boundary
City development cooperation
World newest capital city
Fast development and new attraction
SITE ANALYSIS

Social aspects - ACCESSIBILITY / TRANSPORTATION
D2 is a motorway (Slovak: diaľnica) in Slovakia. It connects the Czech border at Kúty with the Hungarian border at Čunovo, passing through (ordered north to south) Malacky, Bratislava and Jarovce.
D1 motorway (Czech: Dálnice D1) is the main highway of the Czech Republic. Currently it connects the two biggest Czech cities, Prague and Brno.
Highway separates city from waterfront
Residents can only go cross the highway by bridge.
SITE ANALYSIS

CITY STRUCTURE

Social aspects - Post-socialist residential area
Petržalka

SITE ANALYSIS
A quarter of whole city’s residents live in Petrzalka.
The city has been built as a residential area for Bratislava. It structured by separated community neighborhood which is introverted and public services centralized.
Most parts of this area are built as 70s socialist buildings, low dynamic and ugly.
Introverted Neighborhood
Centralized basic public services
Introverted Neighborhood
Centralized basic public services
Twice number of elementary school than old city
No central cultural services for whole city
No functional central public spaces
Waterfront view and activities

SITE ANALYSIS
Low quality and less maintained waterfront area
SITE ANALYSIS

Natural POTENTIAL

Existing various living environment
Amount number of dynamic and lively inhabitants.
Various water sports at rural area
SITE ANALYSIS

Various waterfront building topology and water connection

living environment POTENTIAL
Attractive points POTENTIAL

SITE ANALYSIS
WATER PROCESS

Temporary flow fluctuations

Morphodynamic processes

Sub-process 1: Vertical water level fluctuations

Sub-process 1: Sedimentation shift within the river

Sub-process 1: lateral spread of the water

Sub-process 1: self-dynamic river channel development
Delta works 2.0
Arnhem-Nijmegen urban network

Dike park
mitigate floods together with city development

CASE STUDY

Floods adapting and recreation providing principles in urban and rural area

waterfront park of Hafen city, Germany
Isar river, Germany
REGIONAL DESIGN
BLUE river bypass + GREEN river bypass

River bypass, Kampen, The Netherlands

Delta works 2.0, Arnhem-Nijmegen urban network, The Netherlands
FLUX WATERSCAPES

BLUE river bypass  +  GREEN river bypass

Channel migration  
Channel dynamic  
Creating new channels  
Grading the channel  
Varying the river bed

Extending the space  
Tolerating  
Evading  
Adapting  
Above the water

Creating dynamic waterscapes
MASTER PLAN

FLUX WATER LANDSCAPE

Normal water flow

Floods water flow

Normal water flow

Floods water flow
Dynamic waterscapes & water control
REGIONAL DESIGN POTENTIAL
FLOODS MITIGATION

BLUE RIVER BYPASS
Q=4000-8000 M^3/S

GREEN RIVER BYPASS
Q=8000-14000 M^3/S

Small channels

Farm houses
Vienna BRATISLAVA

white stork Corncrakes balon´s ruffe

Stratiotes Aloides Nuphar lutea

Natural reserve park of Austria

Natural reserve park of Hungary

CONNECTING EXIST NATURAL CORRIDOR

REGIONAL DESIGN POTENTIAL

NATURAL CORRIDOR

white stork Corncrakes balon´s ruffe

Stratiotes Aloides Nuphar lutea
REGIONAL DESIGN POTENTIAL

New boundary landscape
REGIONAL DESIGN POTENTIAL

New boundary diverse attractive landscapes

Dynamic waterscapes
Meadow
Graze
DESIGN ELABORATION
Use existing and add new channels to activate city public spaces.
Waterscape control strategy

MASTER PLAN
1. BIG SCALE
   Regional plan

2. Middle scale

3. SMALL SCALE
   Detail design of waterfront

DESIGN ELABORATION
1. BIG SCALE
Regional plan

FLUX WATERSCAPES
- The transformation of Bratislava as part of the waterscape of the Danube

NEXT STEP & FOCUS

DESIGN ELABORATION
2. Middle scale

?
What is potential and contribution of the new waterscapes to city development and livability?
OLD BRATISLAVA
DANUBE
WATERFRONT
NEW BRATISLAVA
THANK YOU!
BLUE RIVER BYPASS
GREEN RIVER BYPASS