

Presenter: **Arch. Barbara Dal Bo Zanon**
Deltasync, Delft, The Netherlands

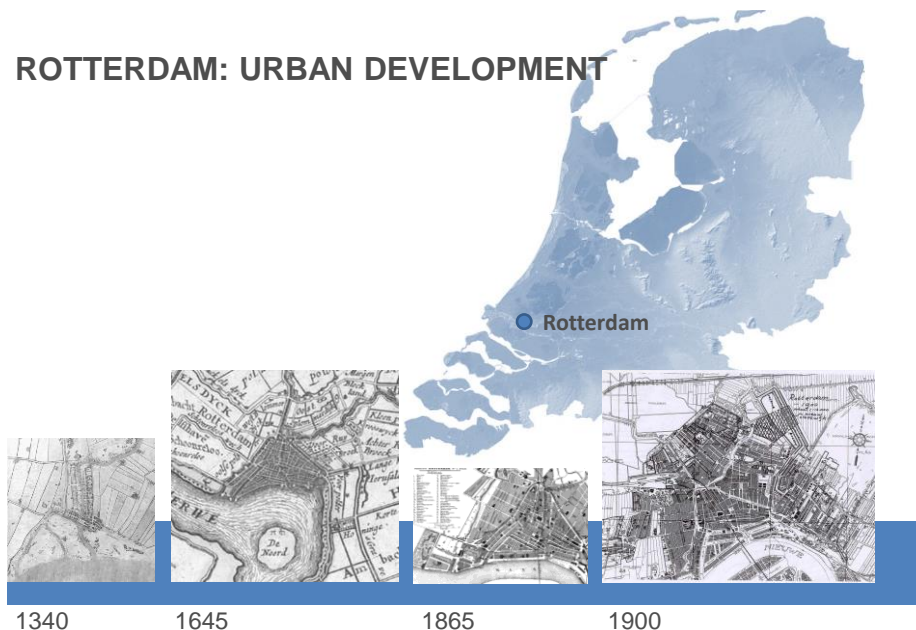
Preliminary study for an **Environmental Impact Assessment of Floating Cities**

B.Sc. Hannah Härtwich
 Bachelor thesis

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ROTTERDAM: URBAN DEVELOPMENT

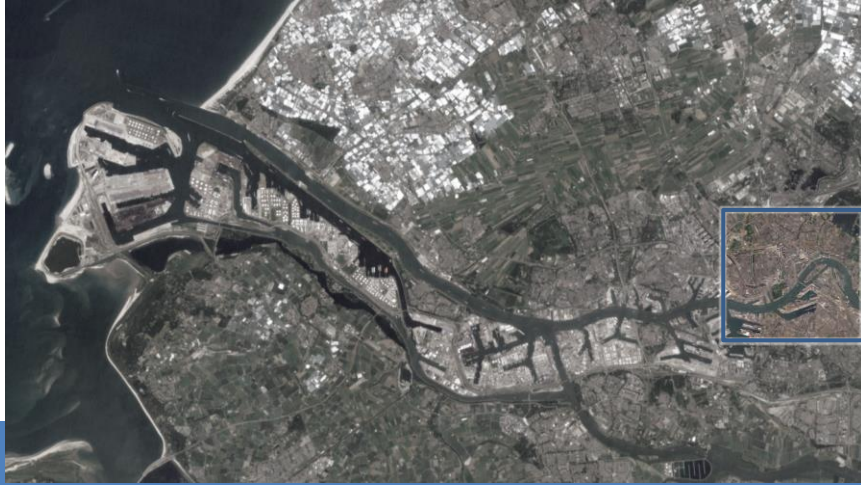


Sources: Wikipedia.nl, Crooswijk.com, Engelfriet.net

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ROTTERDAM: URBAN DEVELOPMENT



2009

Source: NASA

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URBAN DEVELOPMENT AND CLIMATE CHANGE

- sea level rise
- subsidence (3-4 mm/yr.)
- changed behaviour of the Rhine: greater extremes in discharge volumes (620 m³/sec - 18,000 m³/s)
- floods
- salinization of surface water



Source: Dreamstime.com

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CLIMATE PROOF BUILDINGS

Floating Pavilion, Rotterdam (Deltasync and PublicDomain Architects)

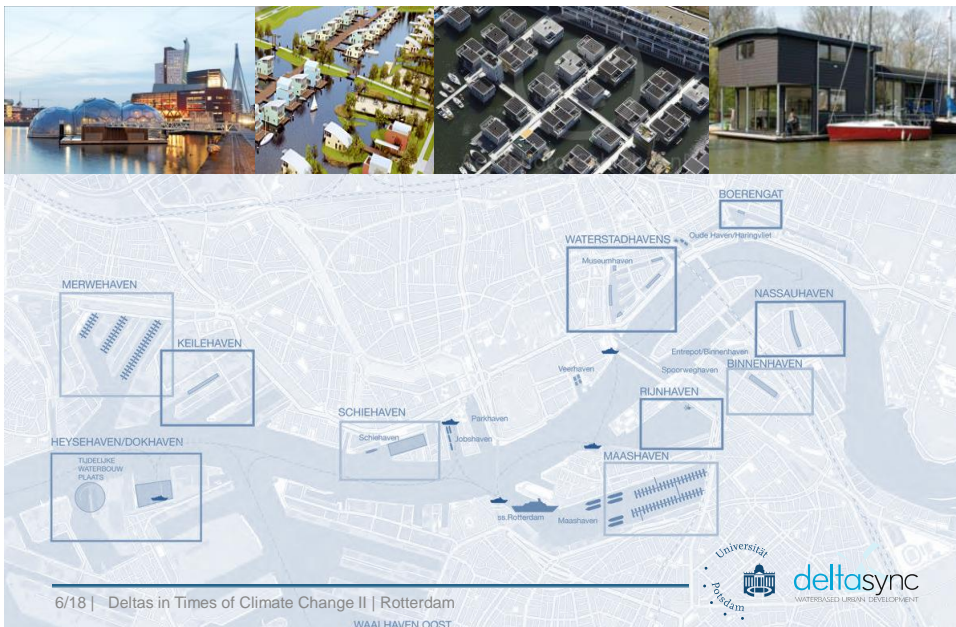


Source: Rotterdam Marketing

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FLOATING DEVELOPMENT



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FLOATING DEVELOPMENT: ENVIRONMENTAL IMPACT?



...what about the
impact on the ecosystems?



Source: Flickr

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ENVIRONMENTAL IMPACT OF FLOATING DEVELOPMENT: STATE OF THE ART

Currently, little knowledge is available.

- floating developments are still an innovative solution
- research on the impacts of floating structures on the environment is at its beginning



Floating houses in Lelystad

Source: Deltasync

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ENVIRONMENTAL IMPACT OF FLOATING DEVELOPMENT: RESEARCH OBJECTIVES

In this research, a **preliminary analysis of potential environmental impact of floating developments** is carried out. With the following **objectives**:

- **gain insight on the potential impacts** of these new types of developments
- provide a **framework to assist the design**, minimizing negative impacts and challenging to achieve positive ones
- give a first advice for **choosing suitable locations**
- for a delta city that is planning new developments, to **evaluate the possible impacts of developments on water in comparison with developments on land**.

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ENVIRONMENTAL IMPACT OF FLOATING DEVELOPMENT: COMPARISON WITH LAND DEVELOPMENTS

- What are the environmental impacts of urban development on land and on water?
- To which extent do they differ?



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METHOD: IMPACT ANALYSIS

Common impacts

(Chemicals, noise, light and thermal pollution, invasive species, ecological traps...)

Land-specific impacts



- USE OF SPACE AND SURFACE
- HUMAN PROTECTION MEASURES

Water-specific impacts



- USE OF SPACE AND SURFACE
- HUMAN PROTECTION MEASURES

- 1) Impacts resulting from the use of space and surface
- 2) Impacts caused by protection measures

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IMPACT ANALYSIS – PART 1

Impacts resulting from the use of space and surface



Source: Flickr



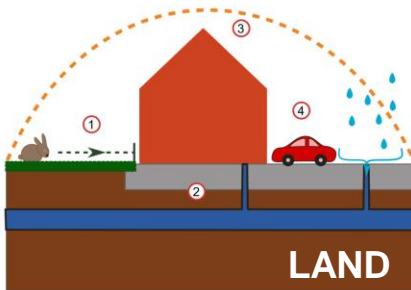
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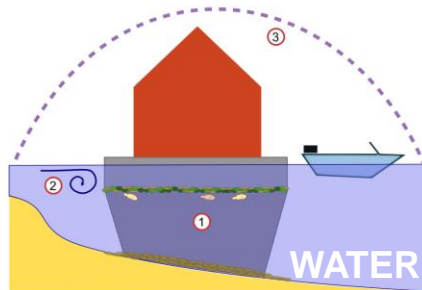
IMPACT ANALYSIS – PART 1

Impacts resulting from the use of space and surface

- ① habitat loss and fragmentation
- ② loss of soil functions
- ③ changed microclimate: heat island
- ④ additional soil sealing for lanes



- ① light obstruction: anaerobic condition
- ② current deviation
- ③ changed microclimate: ??



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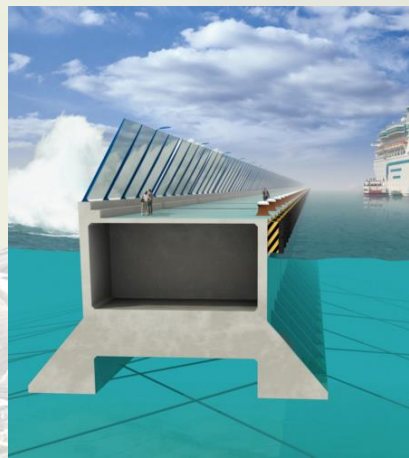


IMPACT ANALYSIS – PART 2

Impacts of human safety measures against environmental hazards



Source: Wikipedia, FDN Engineering







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IMPACT ANALYSIS – PART 2

Impacts of human safety measures against environmental hazards - LAND

Environmental hazards	Safety measures	Impacts
 Flood	Dams, canalisations	On riverine and riparian ecosystems, reducing biodiversity
 Erosion	Hard coastal defence structures	Tidal habitat is lost
 Fire	Vegetation removal	Change of important habitat features, fires of higher intensity
 Earthquake	Earthquake-resistant structures	Additional resources and energy needed

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IMPACT ANALYSIS – PART 2

Impacts of human safety measures against environmental hazards - WATER



Flood




Fire



Erosion



Earthquake

Environmental hazards	Safety measures	Impacts
 Waves	Wave breaker	Change in the coastal ecosystem

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CONCLUSION: BUILDING ON WATER IS AN OPTION THAT SHOULD BE CONSIDERED

- When looking for solutions for future developments of delta cities, **it is important to consider alternatives** to traditional ones
- This research offers a **framework** to evaluate two options, urban development on land and on water, from the environmental impact point of view
- **Both options have impacts.** The best solution should be assessed for each specific location
- Challenges for future developments are also **to reduce the pressure on ecosystems**, which provide important services supporting human life.

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Join our workshop “Creating floating cities”

Thursday 25th, 13:30-15:15
Penn Room 1

To know more on this research and on floating development, visit
www.deltasync.nl

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WORKSHOP

CREATING FLOATING CITIES A DREAM? OR A NEW PERSPECTIVE FOR THE FUTURE OF THE PLANET

When?
THURSDAY 25th | 13:30 - 15:15

Where?
PENN ROOM 1

OBJECTIVES

- Bring together global pioneers from science, government, companies and NGOs working on urban development;
- Exchange knowledge on recent developments regarding floating urbanization;
- Integrate knowledge by looking at floating cities from different perspectives;

OUTCOMES

- Insight in the global potential of floating urban developments;
- Knowledge on obstacles and governance challenges;
- Data and knowledge on water quality and ecological impacts and ways to mitigate these impacts.

TARGET GROUP
Scientists, policy makers, engineers and designers who are motivated to contribute to a future perspective of coastal delta cities.

DELTA IN PRACTICE SESSION
Theme 3 - Urban design and infrastructure

deltasync
WATERBASED URBAN DEVELOPMENT

