Stormwater Management in Hamburg,
Outcomes of the Rainwater Infrastructure Adaptation Project, RISA

Christian Ebel
Free and Hanseatic City of Hamburg
State Ministry of Environment and Energy

Brussels, 21. April 2015
Hamburg – General Facts

Area total – 755 km²
10 % harbour area
8 % water (2,376 bridges)
30 % agricultural area
6 % nature reserve
4 % forest

2nd largest city of Germany
City – 1.8 m inhabitants
Region – 4.5 m inhabitants
2nd largest seaport / Europe
9th largest seaport / World
Organisation of water management

Tasks of water management are performed by different authorities:

- Flood protection
- Water protection (surface and ground water)
- Stormwater management
- Contaminated sediments
- Water conservation

- Management of water bodies of the 2nd category except harbour area and Lake Alster
- Planning and realisation of measures / river restoration
- Maintenance of the smaller water bodies
- Administration

- Water supply
- Waste water disposal
- Stormwater management

- Monitoring of drinking water
- Chemical monitoring of surface water bodies (WFD)
Organisation of water management

- Maintenance and development of the port infrastructure
- Responsible for flood protection measures in the port area and for the area prior to the dikes in the open tidal area of the Elbe:
  - regular measures to provide bank and shore protection,
  - provision of information and precautionary and early-warning measures

- Infrastructure
- Realisation and maintenance of civil engineering works
- Planning, design and construction of flood defences
- Development of safety concepts
- Dike defence

- Water rescue services
- Civil Protection
- Dike protection
Cooperation is essential!

- Different organisations, different responsibilities and tasks
- Complex challenges and high costs need many partners
- Innovative solutions ask for a broad basis
Hamburg – water is coming from all sides

RAIN

GROUND WATER

RIVER

SEA

Photo: www.mediaserver.hamburg.de/M. Zapf
River sections at risk of flooding due to inland storm water > RAIN & RIVER

River sections and coastal areas at risk of flooding due to storm surge > SEA
What can be done?

sustainable & smart
STORMWATER-
MANAGEMENT
Hamburg already has a problem

Foto: D. Derksen

D. Heien
Hamburg already has a problem ...

Peak discharges in urban rivers

> hydrological stress: biological river quality is affected

> pollution: chemical river quality is affected
... and it’s only getting worse

climate change

PRECIPITATION

Future prospects until 2050:
in summer: 7% less precipitation
in winter: 14% more precipitation


Increase of precipitation intensity

(Graphic: http://wiki.bildungsserver.de/klimawandel/index.php/Datei:HH_prec.jpg)
climate change

TEMPERATURE

... and it’s only getting worse

Future prospects until 2050:

Summer temperatures rise by 1.2° C
Heat periods are expected to be longer

(Quelle: Norddeutscher Klimaatlas, Helmholtz-Zentrum Geesthacht; Angaben: Metropolregion Hamburg, 2012)

climate change
SEVERE WEATHER

Future prospects until 2050:

in summer: 1% more severe weather
in winter: 5% more severe weather

(Quelle: Norddeutscher Klimaatlason, Helmholtz-Zentrum Geesthacht; Angaben für die Metropolregion Hamburg. 2012)
DROUGHT
water bodies and wetlands dry up due to long periods without rainfall and low water retention in the catchment area

FLOODING
just a few minutes of heavy rainfall are enough to cause flooding of shops and streets

climate change
... and it’s only getting worse

Hamburg is growing and getting more and more condensed. 6,000 new flats per year are scheduled.

Concentration and sealing are increasing – about 60 hectares of settlement and traffic areas are added every year.
... but space is limited
not only climate change but also urbanisation increases the risk of flooding
... Climate change is affecting the citizens’ safety and quality of life

... Regional Climate Models (REMO) forecast increase of stormwater amount and intensity in summer

... Sea level rise > risk of flooding increases

... The sewage system is constantly being expanded, but capacities remain limited > flooding of sewers
What will it cost?

Costs of storm event in Hamburg

**8,2 Mio. €** on 1. Aug. 2002

(Reference: Bundesministerium für Bildung und Forschung: URBAS – Fallstudie, 2008)

Nationwide projection until 2050:

**330 Mrd. €** for damage related to climate change

(Reference: Deutsches Institut für Wirtschaftsforschung, 6.3.2012)
Rain InfraStructure Adaptation...

... is a joint project by the State Ministry for Urban Development & Environment and HAMBURG WASSER

... aims at future-oriented and sustainable solutions for flooding protection and inland flood control, water body conservation and near-natural water balance

... is part of the climate protection policy and contributes to the adaptation strategy for climate change

(Photo: Free and Hanseatic City of Hamburg, State Ministry of Urban Development and Environment)
RISA and the stakeholders

- Verkehrs- und Straßenwesen
- Umwelt- und Naturschutz
- Stadt- und Landschaftsplanung
- Wasserwirtschaft
- BSU
- Districts of Hamburg
- Senate / Parliament
- Hamburg Water
- Inhabitants / Owners
- Investors
- LSBG
- Science/Universities

RISA Cooperation
Adverse Interests

BWK-DWA Seminar „Starkregen und Überflutungsvorsorge“, Hamburg, 28 März 2014
RISA - stormwater management

Project RISA – Rainwater InfraStructure Adaptation
Forward-looking handling of storm water in Hamburg

Storm Water Management in Hamburg
Selection of Projects

Overriding Goals:
- protection from overflow and flooding
- water pollution control
- near-natural water balance

Project Goal: Reduction of combined sewer overflows
Main Measures:
- construction of deepening transport sewers
- creation of new retention capacity by construction of retention basins and retention tanks
- removal of old intercepting sewers

Storm water management:
- open storm water discharge
- operation with filtration
- improved discharge of quality and quantity of living

Project Goal: Improvement of urban drainage system through integrated consideration of the urban water cycle
Problems:
- water quality problems caused by mud runoff
- stormwater overflows
- local flooding of streets and cellars
Main Measures:
- information campaigns
- stormwater filters in gardens
- infiltration of stormwater in traffic islands
- water retention projects
- weatherproofing of levee structures

Project RISA – Rainwater Infrastructure Adaptation

Storm Water Management Plan, Hamburg
Guideline for Government, Administration, HAMBURG WASSER, Planners and Land owners for a sustainable management of storm water in Hamburg


KLIMAZUG-Nord – Strategic Adaptation Approaches to climate change
we need consistent **SOLUTIONS** for **STORMWATER MANAGEMENT** NOW…

…our **FUTURE LIFE** is at stake

**CURRENT STATE:**

accelerated

**STORMWATER DISPOSAL**

**GOAL:**

decentralised

**STORMWATER MANAGEMENT**
Measures for stormwater management

it all begins at the **SURFACE**

- **BUILDINGS**
- **GREEN SPACES +WATER BODIES**
- **PARKING AREAS**
- **STREETS**
- **PLACES**

(Aerial photo: Deutsche Luftbild GmbH)
Measures for stormwater management

Roof for rainwater storage

Evaporation and transpiration

Facade greening reduces heating of buildings

Infiltration, purification and retention

Rainwater collection

(BUILDINGS)

(Graphic: Atelier Dreiseitl)
Measures for stormwater management

PLACES

Rainwater collection from the side roads

Infiltration

Evaporation and transpiration

Surface run-off

Evaporation and transpiration

Purification

Rainwater collection from the adjacent buildings

Rainwater storage and infiltration

(Graphic: Atelier Dreiseitl)
<table>
<thead>
<tr>
<th><strong>Type</strong></th>
<th>Apartment complex</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Year built</strong></td>
<td>1998</td>
</tr>
<tr>
<td><strong>Area</strong></td>
<td>45.2 ha</td>
</tr>
<tr>
<td><strong>Objective</strong></td>
<td>Living in a green environment with stormwater retention in ditches and ponds, severely throttled discharge</td>
</tr>
<tr>
<td><strong>Build and developed by</strong></td>
<td>GATOR Beteiligungsgesellschaft mbH</td>
</tr>
<tr>
<td><strong>Planned by</strong></td>
<td>PPL Planungsgruppe Prof. Laage</td>
</tr>
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<td></td>
<td>nps Nietz Prasch Sigl und Partner, Hamburg</td>
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<tr>
<td></td>
<td>L&amp;O Landschaftsarchitekten</td>
</tr>
<tr>
<td></td>
<td>Kontor Freiraumplanung, Hamburg</td>
</tr>
</tbody>
</table>
Model II: residential complex
KLEINE HORST, OHLSDORF 12

Type: Residential complex
Year built: 2009
Area: 9.3 ha
Objective: Living in a green environment with near-surface collection and infiltration of stormwater in 12,000 m² of water bodies, basins on a length of 1,100 m and 6,000 m² of retention basins
Built and developed by: Free and Hanseatic City of Hamburg
District office Hamburg-Nord
Planned by: Concept for stormwater and landscape design: Atelier Dreiseitl
Type: Residential complex
Year built: Partly still under construction (2009-2014)
Area: 4.8 ha
Objective: Disconnection from the stormwater sewer system, supply Isebek
Built and developed by:
- Quantum Immobilien AG, Hamburg
- Richard Ditting GmbH & Co. KG, Behrendt Wohnungsbau,
  Bauverein der Elbgemeinden
Planned by:
- Lichtenstein Landschaftsarchitekten;
- Loosen, Rüschoff + Winkler Architekten & Stadtplaner;
- Schenk+Waiblinger Architekten;
- msm meyer schmitz-morkramer Architekten
Integrated Rainwater Management in Hamburg
Necessary changes and options for the administration of water management
Final report of:
RISA-AG 2 / Stadt- und Landschaftsplanung

Streets of the future:
How to use traffic and street infrastructure to protect from stormwater induced flooding
Final Report of
RISA-AG 3 / Verkehrsplanung

Hints for water sensitive design
of streets to store and drain rain water
of events of high precipitation
Final report
RISA-AG 3 / Verkehrsplanung
Overview of working results

Final report
RISA-AG 4 / Planning of surface waters

Dimensioning drainwater storage capacity of surface waters protecting the aquatic communities and ecological requirements.

Final report
RISA-AG 4 / Planning of surface waters
Expert meetings, special reports,…

Final report financing RISA measures

Prof. Dr. Mark Oelmann/ Christoph Czych
Hochschule Ruhr West

HAMBURG in the year 2050

Vision RISA
Fraunhofer-Institut

Corner Stones for RISA-compatible administrative structures.

inter 3
RISA results

Workshops,…

RISA Expert Meeting

“Models to finance the use of green areas, free areas and traffic infrastructure for mitigation measures against storm water impacts“

RISA Workshop

Managing storm water in Mitte Altona

RISA Workshop

Strategies for an innovative drainage concepts in selected areas of Iserbrook 6 und 23 in Hamburg Altona
- Single interests are often stronger than common interests
- The necessary space for technical measures is competing with the required space by housing, development of commercial areas, natural monuments or nature conservation etc.
- Investors are taking decisions in order to maximise profit
- Implementation of RISA still requires „Lobby work“ with political decision takers and land owners.
- „Mental reframing“ (from conventional solutions) to innovative concepts last longer than the development of innovative solutions.
- RISA is still not seen as a chance but as something that produces additional costs
- The cost of initial investments are higher ranked than the costs of maintenance or the mitigation of stormwater damage costs.
Working group reports finalised
Guiding Document Rain/Storm Water Management nearly finalised
Numerous pilot projects initiated, partly already finalised
Documents in preparation for the Senate of Hamburg and the parliament to provide the legal framework for the implementation of RISA results in communal planning and water management.

Further steps in future:

• Continuation of pilot projects
• Information and Communication with stakeholders and real estate investors.
• Application of RISA results by the administration and competent water authorities in Hamburg.
Implementing the conceptual approach of the RISA project as baseline for planning decisions embedded in a sustainable integrated water management of the City of Hamburg“
Thank you for your attention