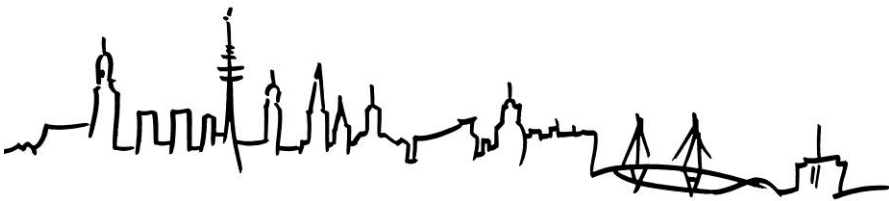


ELKE KRUSE

Design Strategies + Planning Tools

for Integrated Stormwater Management



HCU HafenCity Universität
Hamburg

Department „Sustainable Urban and Infrastructure Planning “

How can we use the transformation process
of our drainage system to enhance the urban fabric?

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How can we use the transformation process
of our drainage system to enhance the urban fabric?



Photo: Elke Kruse

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How can we use the transformation process
of our drainage system to enhance the urban fabric?

Focus:
public space
in highly dense
inner-city areas



Photo: Elke Kruse

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DEFINITIONS

Integrated Stormwater Mangement (ISWM)

... implies an interdisciplinary cooperation, in particular of drainage engineers and urban/landscape planners to implement a water-sensitive form of urban development.

DEFINITIONS

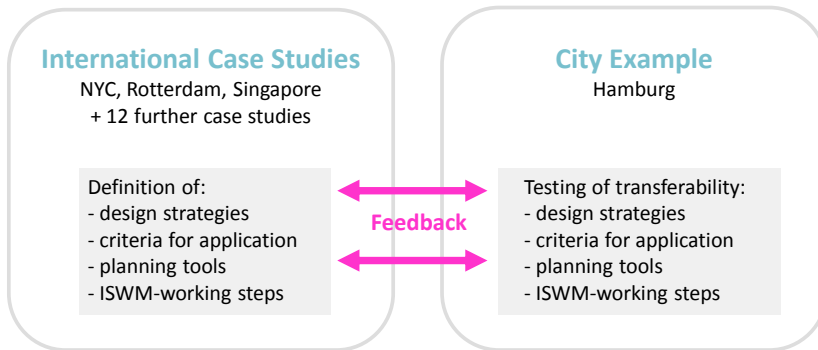
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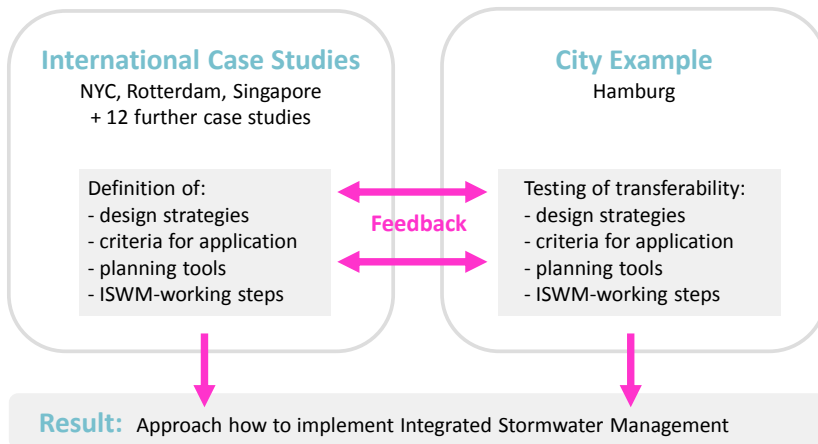
Large-scale Design Strategy

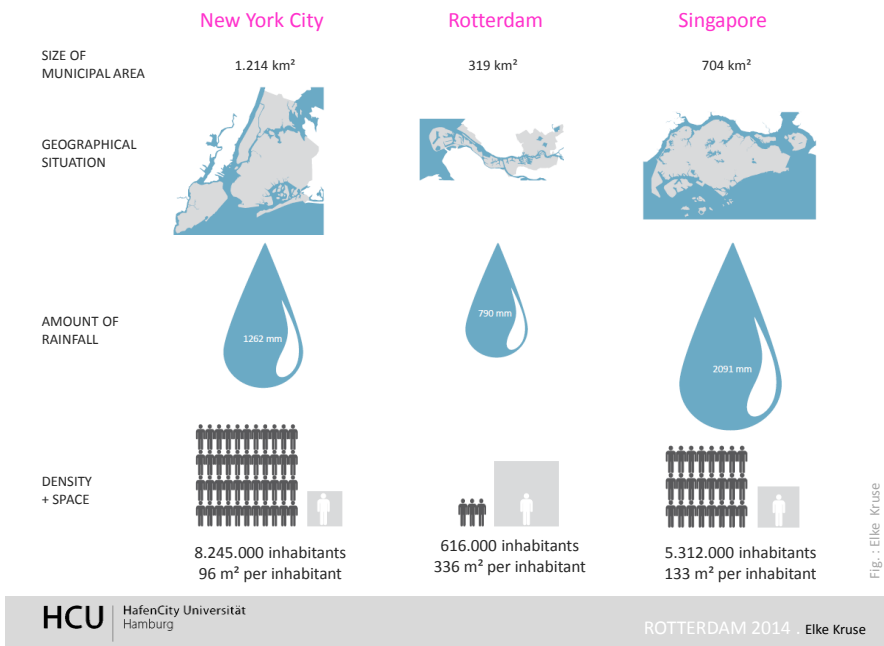
... defines the strategic approach to dealing with (storm-)water which simultaneously provides design qualities for the urban fabric.

APPROACH

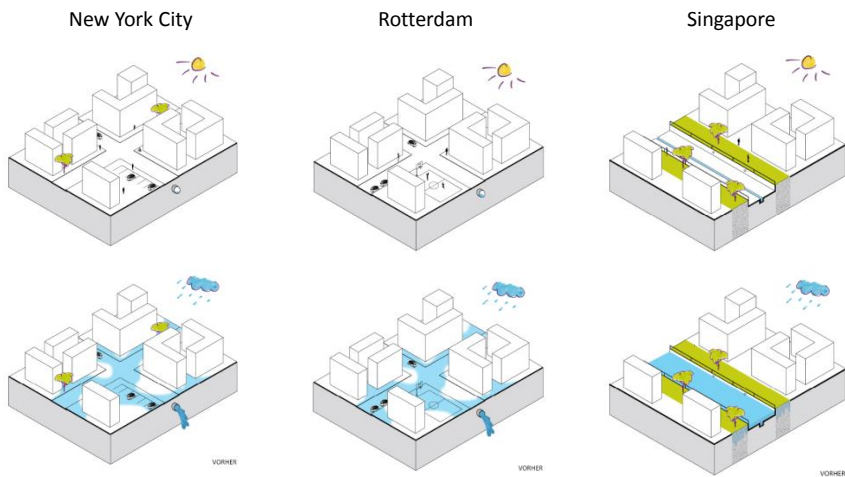


APPROACH





SITUATION BEFORE



Grey permanently turns into Green

Case Study: NYC



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PLANNING INSTRUMENT Green Infrastructure Plan

Analysis of each catchment on a city-wide scale

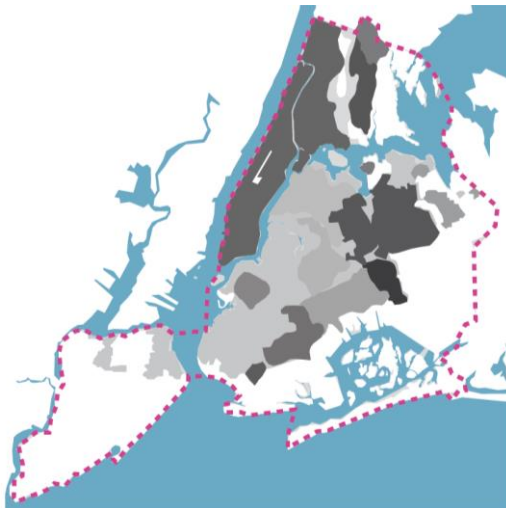


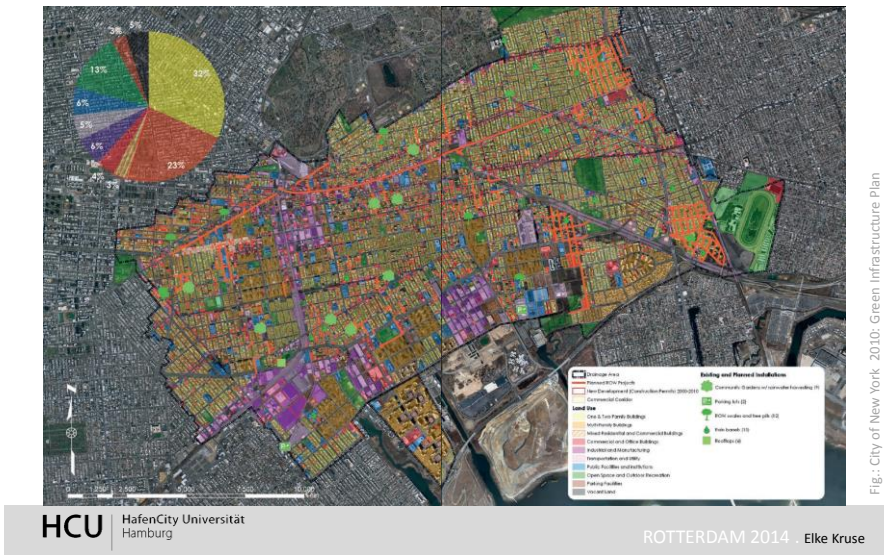
Fig.: Elke Kruse

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PLANNING INSTRUMENT Green Infrastructure Plan

Analysis of opportunities, performance and costs



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ADAPTATION MEASURES

Measures for infiltration (e.g. green streets, street trees)



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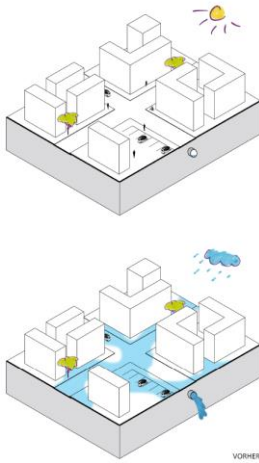


Fig.: Elke Kruse

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DESIGN STRATEGY to create a green network in the city

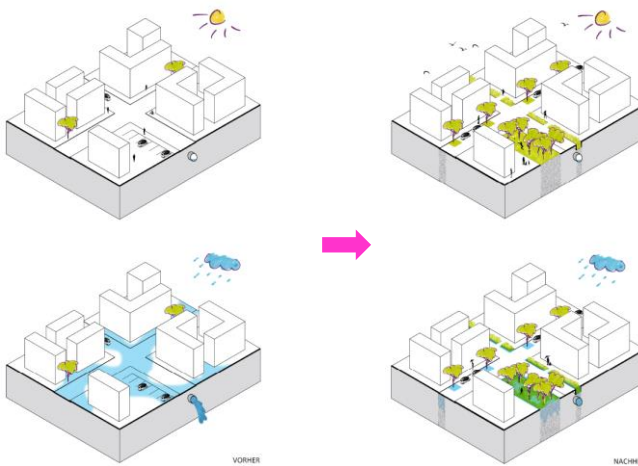


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CRITERIA FOR APPLICATION

SITE CONDITIONS

- potential for infiltration
(permeable ground, sufficient distance to groundwater level,
no soil contamination)
- availability of space
(e.g. through optimization of transport infrastructure)
- required reconstruction of existing green spaces

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SITE CONDITIONS

- potential for infiltration
(permeable ground, sufficient distance to groundwater level,
no soil contamination)
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(e.g. through optimization of transport infrastructure)
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SPATIAL TYPOLOGIES

- traffic areas (including footpaths or parking lots) and
existing roadside planting
- existing green spaces with a quality deficit

Grey temporarily turns into Blue

Case Study: Rotterdam



Photo: Elke Kruse

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PLANNING INSTRUMENT interdisciplinary Water Plan

Analysis of water storage shortages



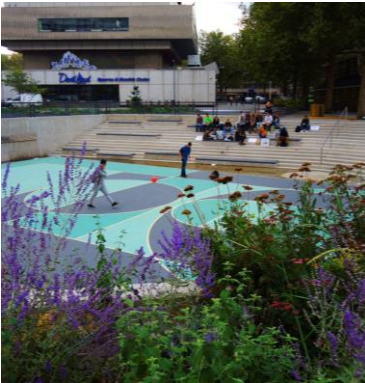
Fig.: Gemeente Rotterdam et al. 2013: Waterplan 2, Herijking

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ADAPTATION MEASURES

Controlled flooding of impervious surfaces (e.g. water squares)



Photos: Elke Kruse

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ADAPTATION MEASURES

Controlled flooding of impervious surfaces (e.g. water squares)



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PLANNING INSTRUMENT interdisciplinary Water Plan

Analysis of urban structure types

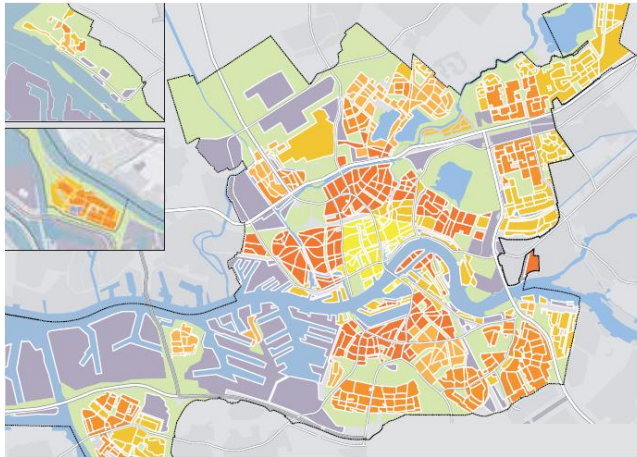


Fig.: Gemeente Rotterdam et al. 2013: Waterplan 2, Herijking

PLANNING INSTRUMENT interdisciplinary Water Plan

Catalog of measures for urban structure types

- Industrial Areas
- City Centre
- City District Centre
- Garden Village
- Garden City
- Building areas after 1970
- Open Space



Fig.: Gemeente Rotterdam et al. 2013: Waterplan 2, Herijking

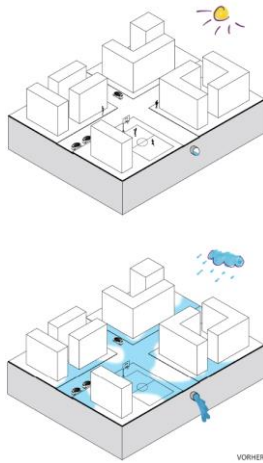


Fig.: Elke Kruse, based on figure of De Urbanisten

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DESIGN STRATEGY to create a temporarily blue network in the city

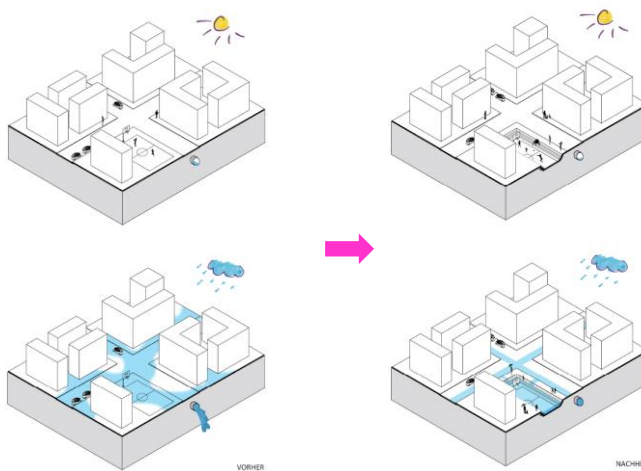


Fig.: Elke Kruse, based on figure of De Urbanisten

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CRITERIA FOR APPLICATION

SITE CONDITIONS

- no potential for infiltration
(impervious soil, a high groundwater level or soil contamination)
- no availability of space

CRITERIA FOR APPLICATION

SITE CONDITIONS

- no potential for infiltration
(impervious soil, a high groundwater level or soil contamination)
- no availability of space

SPATIAL TYPOLOGIES

- district squares
- playgrounds and sports fields
- parking lots (which may also only be partially flooded)
- streets or street blocks

Grey-Blue turns permanently into Blue-Green Case Study: Singapore



Photo: Elke Kruse

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PLANNING INSTRUMENT

Interdisciplinary masterplan on an island-wide scale

ABC-Masterplan



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ADAPTATION MEASURES

renaturated river sections for the delay of discharge and cleansing of water



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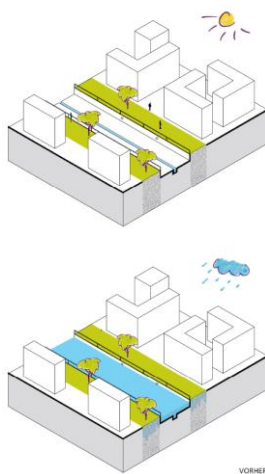


Fig. : Elke Kruse, based on figure of Atelier Dreiseitl

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DESIGN STRATEGY to create a blue-green network in the city

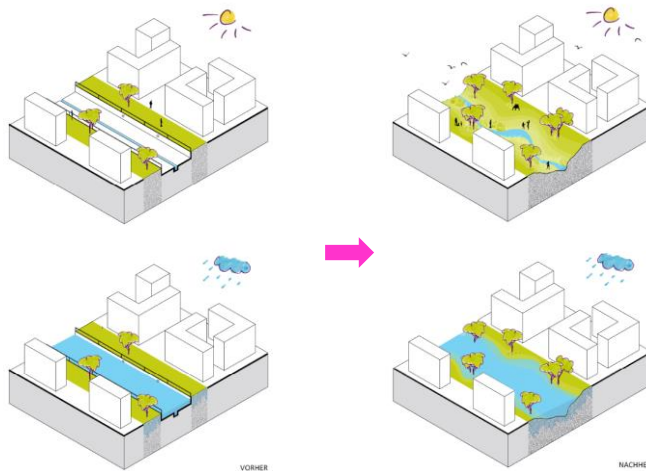


Fig.: Elke Kruse, based on figure of Atelier Dreiseitl

CRITERIA FOR APPLICATION

SITE CONDITIONS

- river section with risk of flooding, drying out at low water or too little ecological value
- piped river section with too little capacity or in need of renovation
- availability of space
- urban quarter with major urbane deficits

CRITERIA FOR APPLICATION

SITE CONDITIONS

- river section with risk of flooding, drying out at low water or too little ecological value
- piped river section with too little capacity or in need of renovation
- availability of space
- urban quarter with major urbane deficits

SPATIAL TYPOLOGIES

- river section or piped river section
- formerly system of open trenches and ditches
- along the river: public green space, streets which can be relocated or private plots which can be purchased

ISWM-Working steps

1. **Interdisciplinary team**
(water managers, urban/landscape planners, and – if necessary - traffic planners)
2. Analysis + identification of priority areas on a **city-wide scale** (water + public space)
3. Consideration of **urban structure types**
Aim: to identify highly dense inner-city areas where **public space** must be retrofitted
4. **Preliminary assessment** to select + apply a suitable design strategy
(e.g. analysis of water storage shortage + infiltration capacity + availability of space)
5. Creation of a **vision and guidelines** + support through a political resolution
6. Generation of a city-wide plan or an integrated masterplan which is based on catchments (river oder sewer system)
7. Implementation of **pilot projects** and **information + involvement** of the public

RESULTS

LARGE-SCALE DESIGN STRATEGIES

- contribute to sustainable urban development
- create space for water in different ways
- quality of life within the cities is improved

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- contribute to sustainable urban development
- create space for water in different ways
- quality of life within the cities is improved

TRANSFERABILITY

- application suitable for cities that are
 - already showing drainage problems and/or
 - will be affected by climate change

If public space is characterized by quality deficits or a lack of open space is observable, an integrated approach should be applied.

Thank you

elke.kruse@hcu-hamburg.de



KLIMZUG-NORD



RISA
Regionalentwicklung
Leben mit Wasser



HCU

HafenCity Universität
Hamburg

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PhD Project

Integrated stormwater management for the water-sensitive retrofit of existing urban quarters

Large-scale design strategies, planning tools and working steps
for the qualification of highly dense inner-city areas

Supervisors:

Prof. Dr.-Ing. Wolfgang Dickhaut, HCU

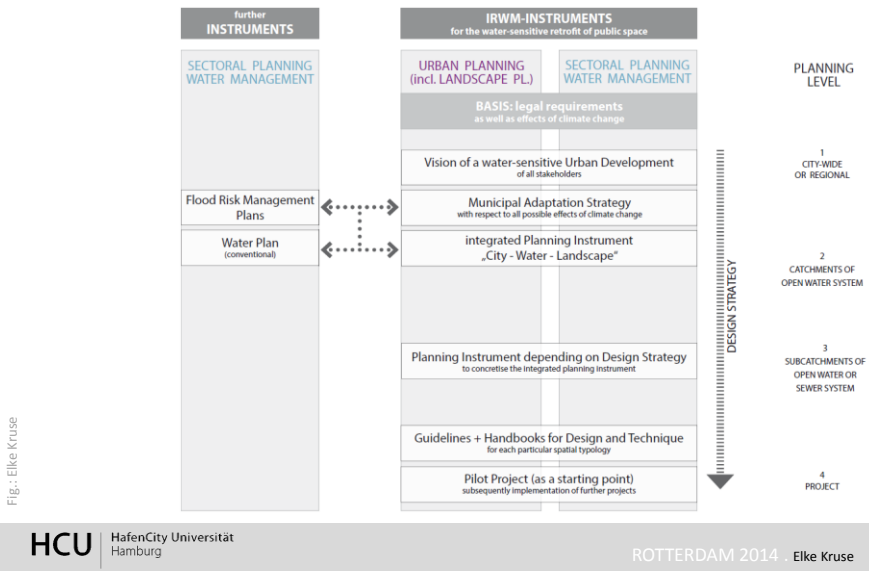
Dr.-Ing. Lucia Grosse-Bächle, Studio Urbane Landschaften

Prof. Dr.-Ing. Michael Koch, HCU

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ESSENTIAL PLANNING INSTRUMENTS



APPROACH

