DAAD-Exchange between RECWET and ISA

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Background

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- DAAD = German Academic Exchange Service
- Exchange program:
  "Urban water within a changing globe"
- Running time 01/2011 – 12/2013
- Aim:
  Allow Japanese and German researchers to visit each other and do research together

Research topic

- *Comparison of climate change effects on sewer situation in Germany and Japan*
  - Adaptation of CSO
  - Water Sensitive Urban Design
  - Show differences and similarities
  - Recommendations

Chronology

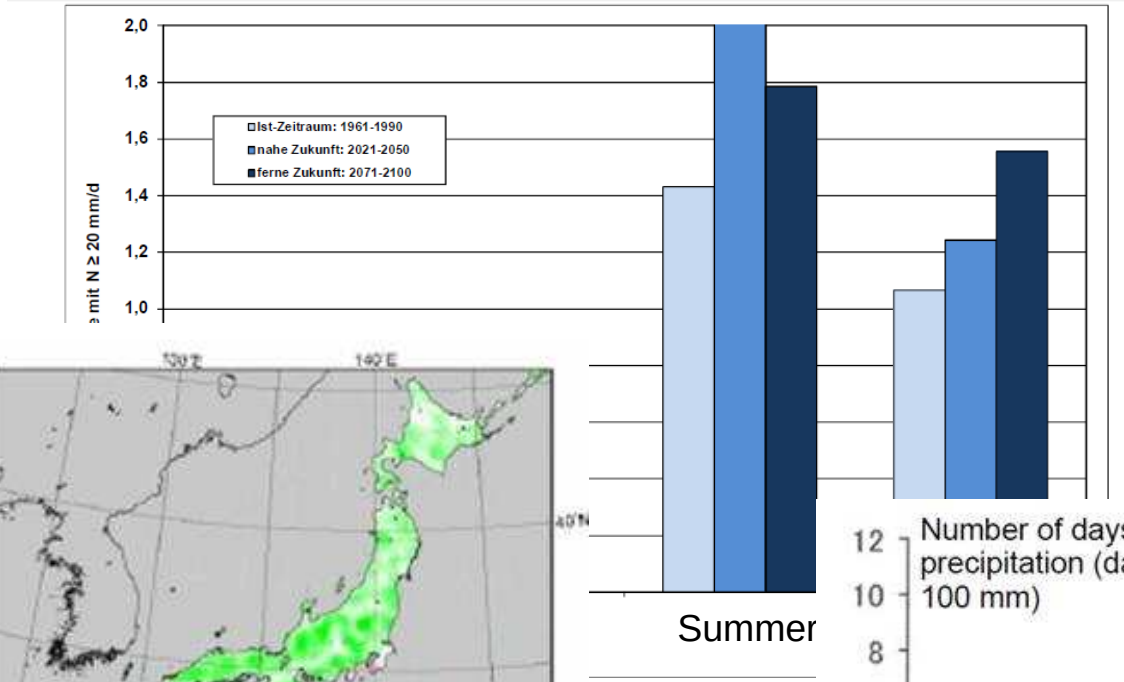
- Sep/Oct 2011: Ulf Schulze-Hennings in Tokyo
- Oct/Nov 2012: Wenchao Xue & Allan Tabucanon in Aachen
- Jan/Feb 2013: Danièle Mousel in Tokyo
- May/Jun 2013: Anna Abels in Tokyo
- **Today: Workshop Urban Water within a Changing Globe**
- Next Step: Elaboration of final report

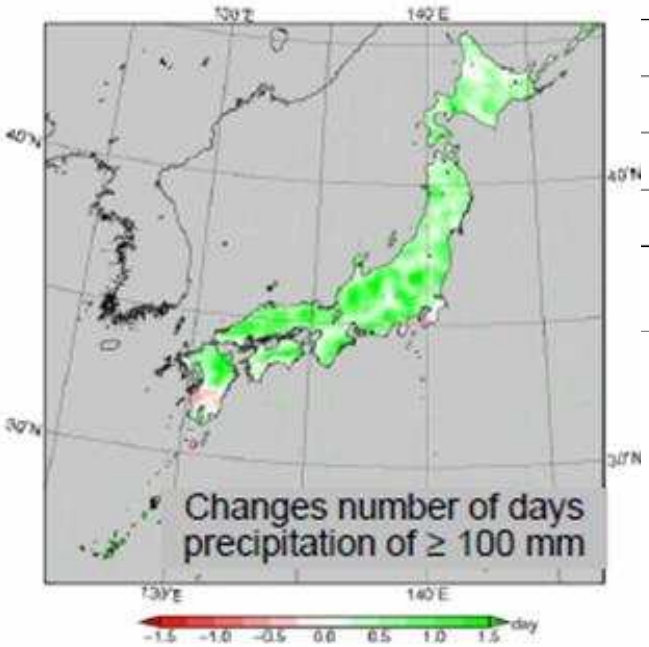
Research outline

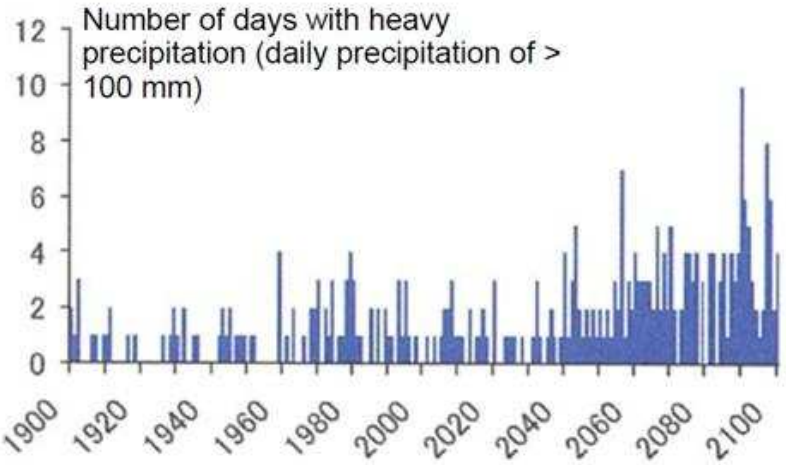
Japan	Germany
Climate change in Japan and Germany	
Country description	Country description
Tokyo	Emscher-Lippe-Region
Climate change in Japan and Tokyo	Climate change in Germany and Emscher-Lippe region
State of the art and impacts of climate change	
Urban drainage and stormwater management in Japan	Urban drainage and stormwater management in Germany
Impacts of climate change on the sewer system	Impacts of climate change on the sewer system
Countermeasures against the impact of climate change	
Description of measures	Description of measures
Examples in Tokyo	Examples in Emscher-Lippe-Region
Expert`s opinions	Expert`s opinions
Comparison of strategies for both countries	
Conclusions and recommendations	

Future precipitations in Germany and Japan

Days with more than 20 mm/d precipitation in Emscher-Lippe Region







Changes in number of rainfall events > 100 mm in annual (left, Scenario A2) and in summer (right, Scenario A1B

(Quirmbach 2011, JMA 2005 and University of Tokyo et al. 2007)

Consequences on the sewer system

- Sedimentation in dry periods:
  - Smells, corrosion
- In the case of heavy rain events:
  - Mobilization of sediments
  - Discharge of diluted wastewater or grease balls into surface water
  - Flooding in urban areas (densely built-up areas in Tokyo)
- Consequences always dependent on local conditions
- 2 main paths for future prevention:
  - Removal of surfaces from the sewer system and retention of rainwater
  - Safe evacuation of rainwater

(Mack et al. 2011)

Adaptation of German sewer systems – 1

European Standard EN 752:2008:

➡Possible consequences of climate change should be considered to assure the perfomance of the system during the whole life cycle

Sewer design (DWA A 118):

➡Precautionary consideration of climate change possible

➡Diminution of frequency of design rainfall -> increase in design rainfall intensity

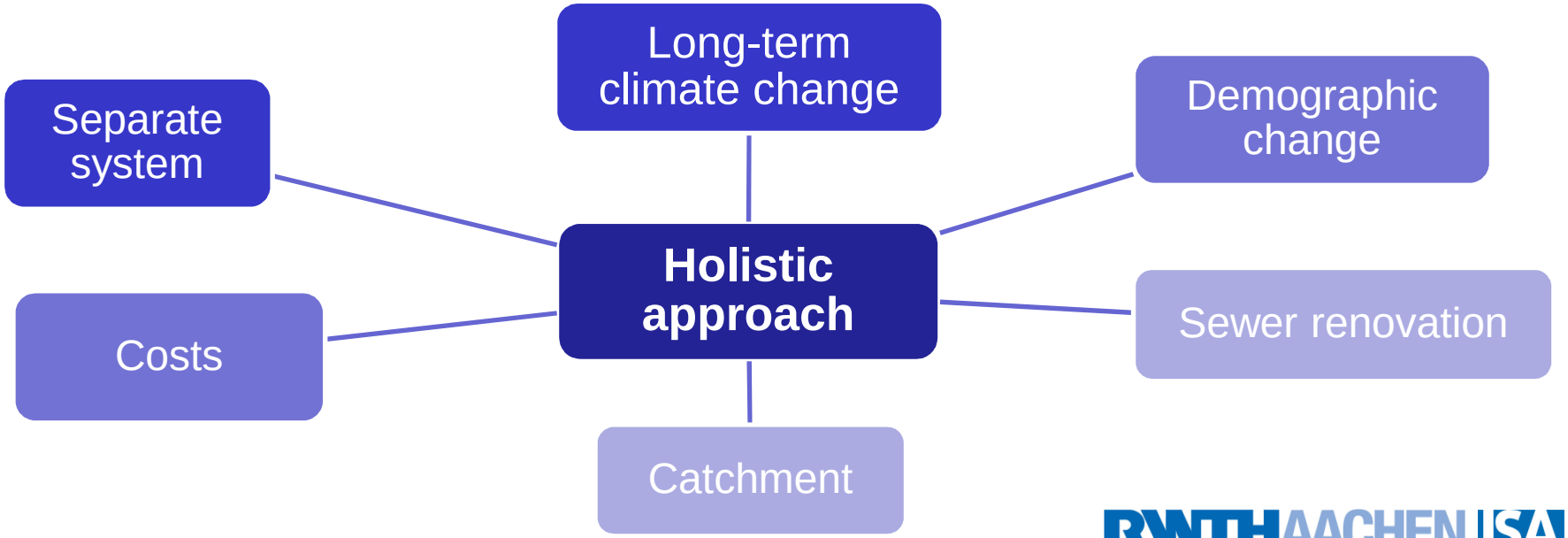
Design frequencies according to DWA A-118 (1-time in „n“ years)	Recommended reduced frequencies (1-time in „n“ years)	Increase in design rainfall intensity (Kostra-DWD 1997)
1 in 1	1 in 2	22 to 40 %
1 in 2	1 in 3	10 to 19 %
1 in 3	1 in 5	12 to 21 %
1 in 5	1 in 10	14 to 23 %
1 in 10	1 in 20	12 to 19 %

(LFU Bayern 2009)

Adaptation of German sewer systems – 2

Existing sewers:

- Generally designed with heavy rain events
- No general need for adaptation but reasonable if:
  - Observation of increased flooding
  - New areas in the catchment
  - Update of general urban drainage plan
  - Renovation of sewers



(LFU Bayern 2009)

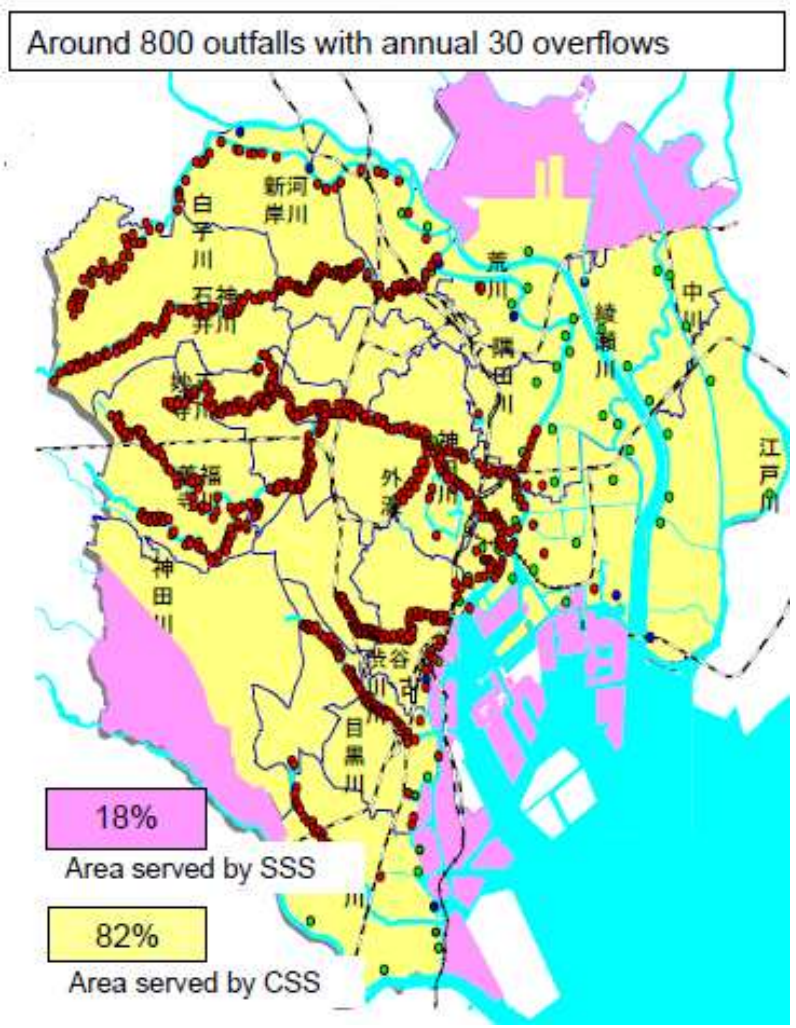
Adaptation of Japanese sewer systems – 1

➡Increased frequency of discharges from combined sewers sytem

➡CSO control projects:

- Reduce the overflow of the debris i.e. oil balls (urgent-term)
- Halve the frequency of untreated wastewater overflow (mid-term)
- Reduce the discharged pollution to less than the equivalent amount of pollutant loads from the separate sewer system (biological oxygen demand (BOD) < 40 mg/L) (longterm)

➡Separation of flow (separate sewer system)



Sewer System Improvement Committee, Japan

Adaptation of Japanese sewer systems – 2

➡Rainwater storage in Tokyo

➡Example: Kanda River storage tunnel

- retention volume of 540,000 m³
- total length: 4.5 km
- inner diameter: 12.5 m
- 34 to 43 m underground

➡In the future:

- adaptation of design rainfall intensity from 50 mm/hr to 75 mm/hr

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Japan and Germany

➡Increase in overall precipitation

➡Increase of heavy rain events, especially in summer

➡Different adaptation measures in both countries due to different boundary conditions:

- Densely built-up areas in Tokyo compared to several more rural areas in Emscher-Lippe region
- Significantly higher rain fall intensities in Japan than in Germany

➡Both countries are facing the challenge of climate change in their own, adapted way

To conclude, some impressions

And now…time for lunch!

ありがとう ございます

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