

(Storm-)water Management Challenges in the Randstad Holland

Floris Boogaard,
Beijing 2015

Dr.ir. F.C. (Floris) Boogaard,
(020) 606 32 50/06-51 55 68 26
e-mail: f.c.boogaard@tudelft.nl
floris.boogaard@tauw.nl







Introduction








- Research
- Education
- Consultancy



Content

1. Challenges in water management
2. 101 solutions
3. Approach: mapping and SUDS
4. But do they work?
 - Design versus experience
 - Great Examples
5. Int. knowledge exchange
6. More info?






Dutch water management: Quantity 'urbanisation changed: waterbalance'

1900



1970



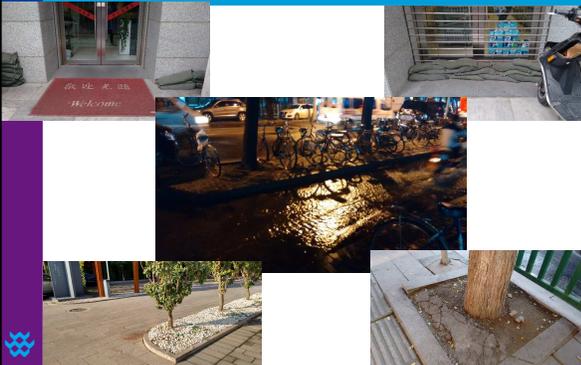
2012







A walk in Beijing





Europe: floodings...



Thailand, river floodings

Why a dialogue? Stormwater floods in São Paulo/Brazil

Tuesday 8 December 2009 • January 2010 Saturday 2 January 2010
 Deaths: >66 • Deaths: >64 Deaths: >57

January 2011 Friday 9 September 2011 10 January 2012
 Deaths: >432, (incl. Rio de J) Deaths: >2 Deaths: >28

Major flooding in Beijing after the heaviest rain storm in 60 years

"Chinese cities are apparently unpractised in facing disasters such as Saturday's torrential downpour," the Global Times daily said in an editorial critical of the authorities' disaster preparedness. "If so much chaos can be triggered in Beijing, the capital of the nation, problems in urban infrastructure of many other places can only be worse."

Source: www.telegraph.co.uk/news

Major flooding in Beijing after the heaviest rain storm in 60 years

Source: www.telegraph.co.uk/news

Heatstress/ drought

Heatstress

Beijing ponders heat-stroke warning index

Health | Sun May 27, 2007 7:43am BST

Beijing sizzled in 37.2-degree Celsius (98 Fahrenheit) heat on Saturday, the highest for the month since 1951.

The new heat-stroke index would break down the impact of high temperatures by age and sex, the report quoted Huang Zhuo, a researcher at the national meteorological centre as saying.

Heat-stroke warnings could be issued in weather forecasts for the 2008 Olympic Games, the Xinhua news agency said, after the temperature in the capital soared to its highest May level in more than 50 years.

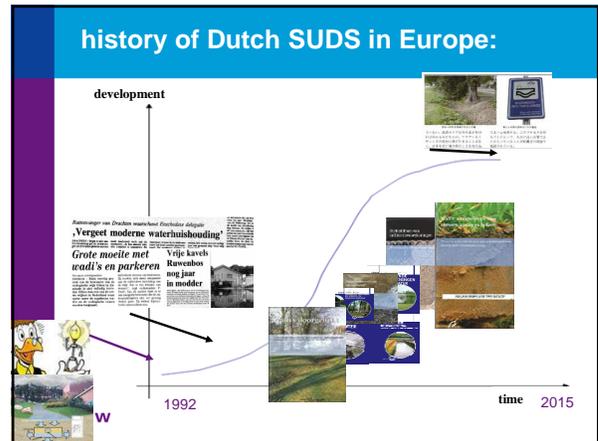
Source: www.reuters.com

Multiple benefits

SUDS as: green roofs, tree planting, bioretention & infiltration, permeable pavements and water harvesting have benefits in terms of: **Water, Energy, Air quality, Climate Change, The urban heat island effect, Community liveability, Habitat improvement and Public education**

Practice	Reduces Stormwater Runoff										Improves Community Livability									
	Reduces Water Treatment Needs	Improves Water Quality	Reduces Grey Infrastructure Needs	Reduces Flooding	Increases Available Water Supply	Increases Stormwater Retention	Reduces Salt Use	Reduces Energy Use	Improves Air Quality	Reduces Atmospheric CO ₂	Reduces Urban Heat Island	Improves Aesthetics	Increases Recreational Opportunity	Reduces Noise Pollution	Improves Community Cohesion	Urban Agriculture	Improves Habitat	Cultural/Public Education Opportunities		
Green Roofs	●	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○		
Tree Planting	●	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○		
Bioretention & Infiltration	●	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○		
Permeable Pavement	●	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○		
Water Harvesting	●	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○		

● Yes ● Maybe ○ No

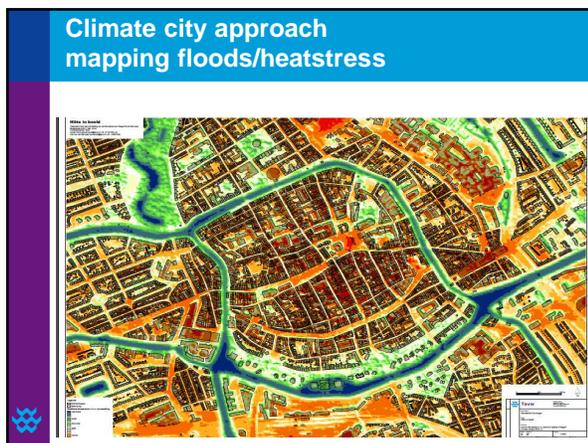


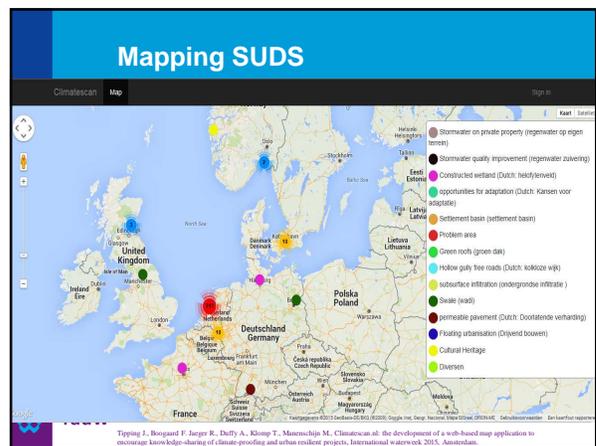
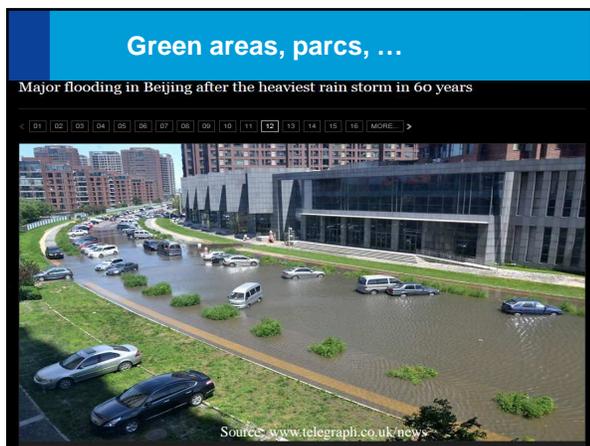
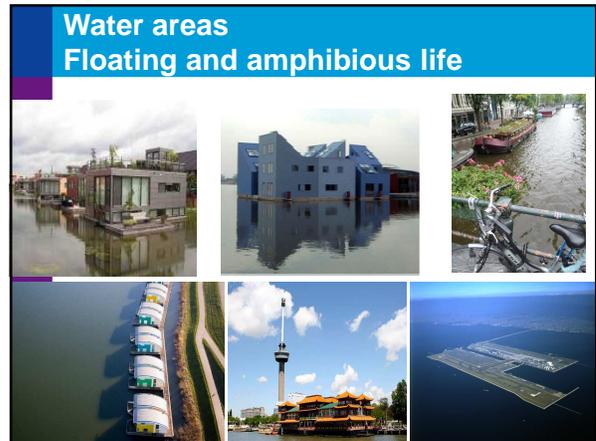
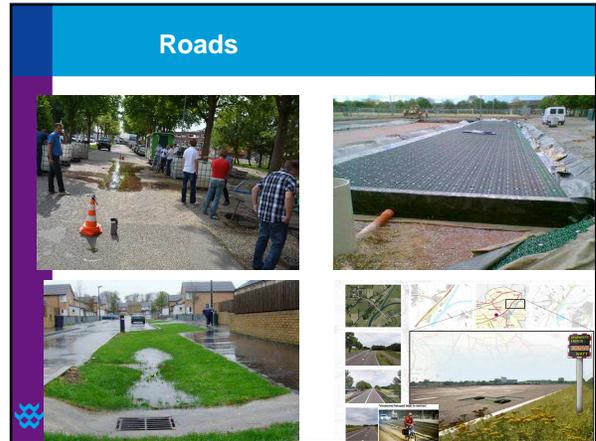
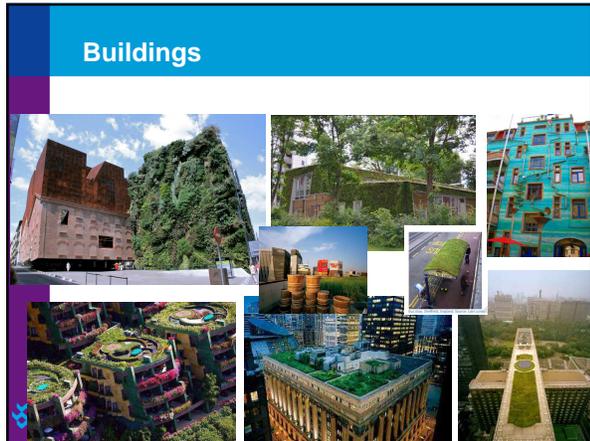
Climate city approach Multifunctional and space for water

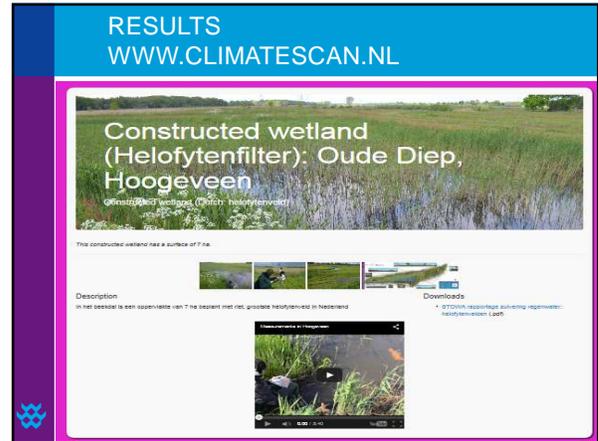
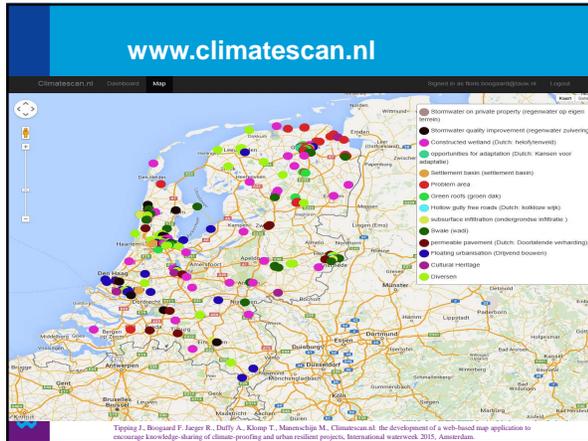
- Mapping
- Buildings
 - Roofs
 - Green buildings
- Squares
 - Open areas
 - Playgrounds
- Roads
 - Road surface
 - Road storage
 - Near roads
- Green
 - parcs

Tauw • Little green islands

An aerial map of a city with various urban features highlighted in different colors. Below the map is a grid of small images showing different SUDS applications like green roofs, permeable pavements, and urban agriculture.







Cost efficiency? infiltration rates swales



Encouraging results
On infiltration rates
Worse case scenarios
>20 years



Piles of research books and documents, that nobody reads so.....



interactive communication: meetings, fieldtrips, interviews, courses, seminars, jobrotation, augmented reality, serious gaming, ...



Tauw

LinkedIn | Facebook | SKINT

General conclusions

- We share the same challenges
- share solutions
- Tools
 - Mapping methods
 - Use existing infrastructure
 - Multifunctional
 - From design to reality check and back
- international knowledge exchange
 - Next step
 - Designing water
 - City approach
 - Quantity (infiltration groundwater recharge, ...)
 - Quality (soil and waterquality, detailed design wetlands etc)



Tauw 5-10-2015 Kennicentrum NoorderBuitze bureau NoorderBuitze