

High resolution decision maps for urban planning: a combined analysis of urban flooding and thermal stress potential in Asia and Europe

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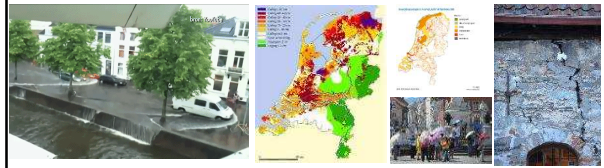


High resolution decision maps for urban planning: a combined analysis of urban flooding and thermal stress potential in Asia and Europe

Abstract: Urban flooding and thermal stress have become major issues for urban planning. The high resolution decision maps for urban planning provide a combined analysis of urban flooding and thermal stress potential in Asia and Europe. The maps are based on a combination of satellite data and ground-based data. The maps are used for urban planning and decision making. The maps are available for download from the Hanze University of Applied Sciences website.

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Challenges urban climate (change): Netherlands



examples of problems in the urban areas: floodings, degradation of waterways, heatstress, drought leading to lower groundwater table and subsidence with results as damage of buildings



Boogaard F.C. Climate adaptation from Groningen to Macao. Inaugural speech on Spatial Transformations - Water, ISBN 9789081935692 Kenniscentrum Noordruimte Hanze Hogeschool, Groningen, February 2016.

Program

- Introduction
- Method
 - Mapping flooding
 - Mapping heatstress
 - Combined maps
- Conclusions
- More info



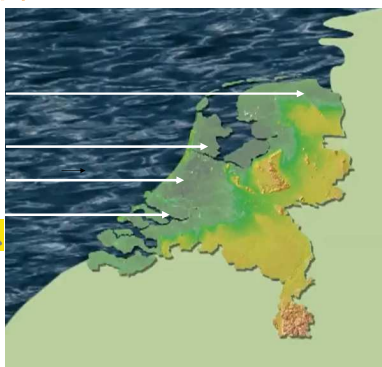
WSP: Water in a changing world.
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Introduction: 简要介绍



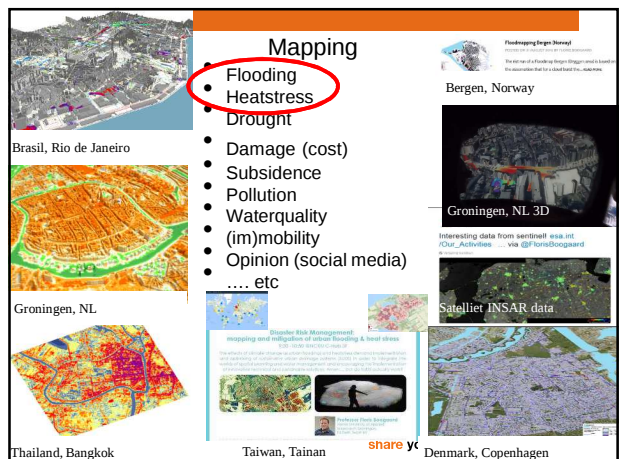
Kenniscentrum NoordRuimte



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Mapping

- Flooding
- Heatstress
- Drought
- Damage (cost)
- Subsidence
- Pollution
- Waterquality
- (im)mobility
- Opinion (social media)
- etc



Program

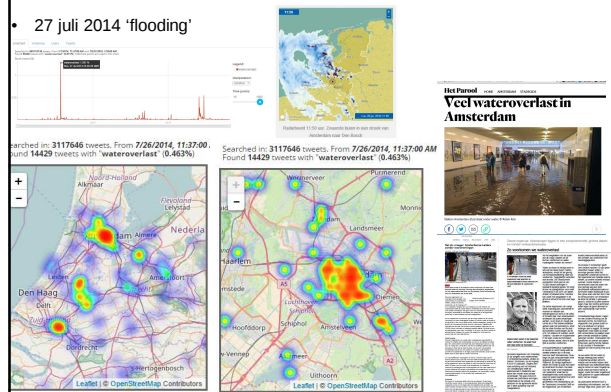
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KWP: Water in a changing world.
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Using social media for calibration of models

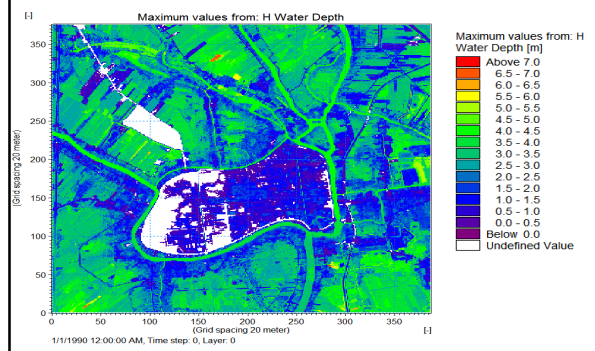
- 27 juli 2014 'flooding'



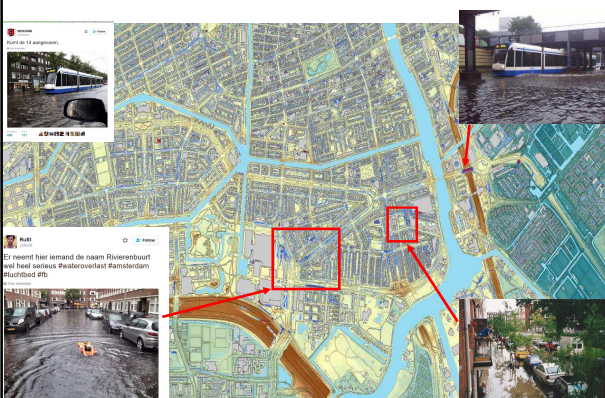
Floodmodel Amsterdam



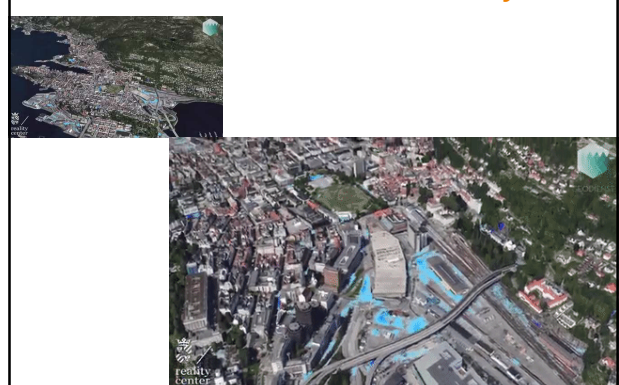
Floodmodelling Asia



Floodmodel Amsterdam: verification



3D flood visualisation: Norway



Example: Europe Copenhagen (appr. 150 mm/h)

Cloudburst in Copenhagen July 2011



The economy of adapting!

Damages over the next 100 year

Sea:	2-2.6 bill Euro
Rain:	2-2.1 bill Euro
Total:	4-4.7 bill Euro

Adaptation measures

Sea:	530 mill Euro
Rain:	800 mill - 1.1 bill Euro
Total:	1.3 - 1.6 bill Euro

We save: 2.6 - 3.2 bill Euro.

July 2011 - damages

- More 150 mm rain within 2 hours
- Close to 1 billion euros
- Damage to critical infrastructure
- Hospitals moves from basement
- Emergency services (fire)

Reality check



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From Floodmap to Climateproof city approach

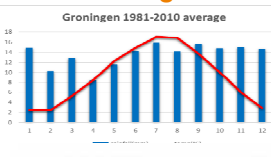
Multifunctional and space for water

- **Mapping flooding/heatstress**
- Buildings
 - Roofs
 - Green buildings
- Squares
 - Open areas
 - Playgrounds
- Roads
 - Road surface
 - Road storage
 - Near roads
- Green
 - parcs
 - Little green

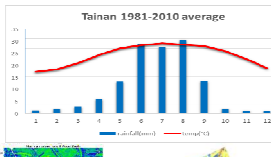


Modelling in different climates

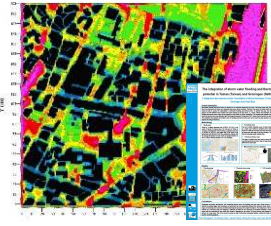
Groningen 1981-2010 average



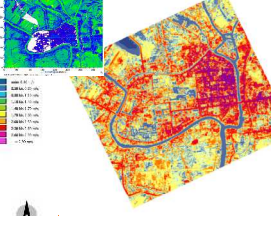
Tainan 1981-2010 average



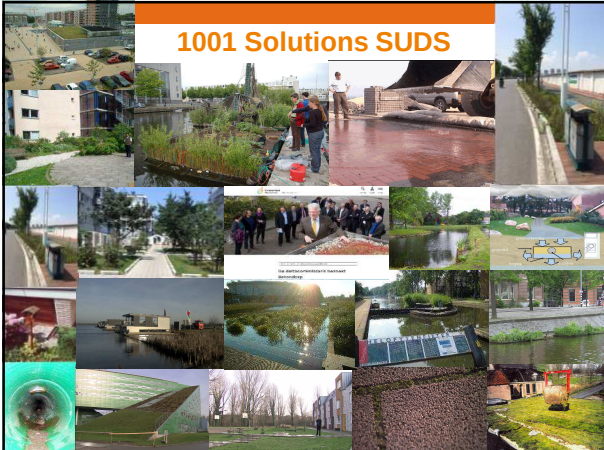
Heatstress Tainan (Taiwan)



Heatstress map in Ayutthaya (Thailand)



1001 Solutions SUDS



Groningen



更多信息?

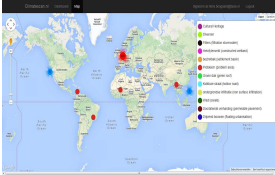
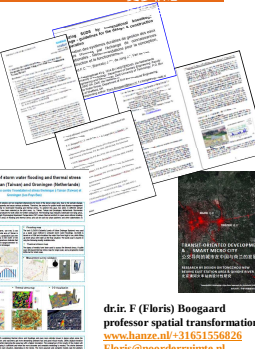
More info? Lets interact...

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The integration of water, energy, food, and climate systems
 presented in Water, Energy and Climate: Interlinkages

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More info? [Stresstest Groningen](#) and [Hoogetveen](#) on www.climatescan.nl

Groningen climateproof Algemeen

Other campaigns (Groningen)



Hoogetveen algemeen