

High Resolution Thermal Stress mapping In Africa: Decision Maps for Urban Planning in Johannesburg

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Introduction

Science



Kenniscentrum NoorderRuimte

practice

Models

Verification

engagement



Westerdijk Foundation



Delft University of Technology

Education

Local

stakeholders

Assess

Practical

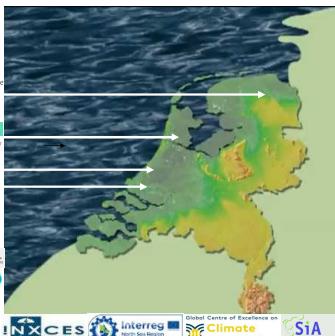
Practice

Education

Assess



aqualinks



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Content

- 1. Introduction
- 2. Challenges
- 3. Tools: climatemaps
 - 1. Heatstressmaps
 - 1.The Netherlands
 - 2.Asia
 - 3.Africa
- 4. Next steps
 - Solutions and more info
 - Find us, working together?

Analyse

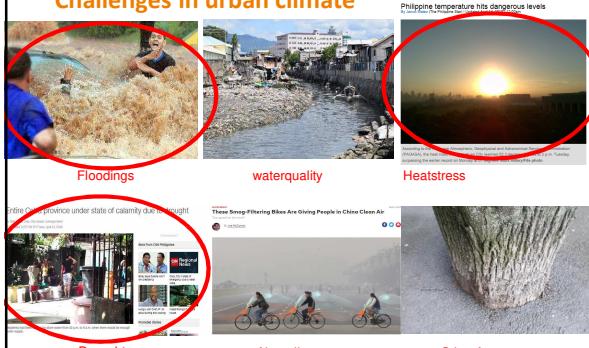
Formulating your ambition

Action



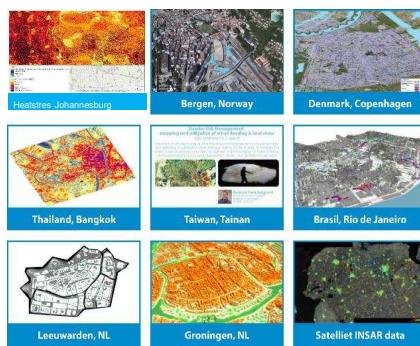
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Combined solutions for Challenges in urban climate



Urban Climate models

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

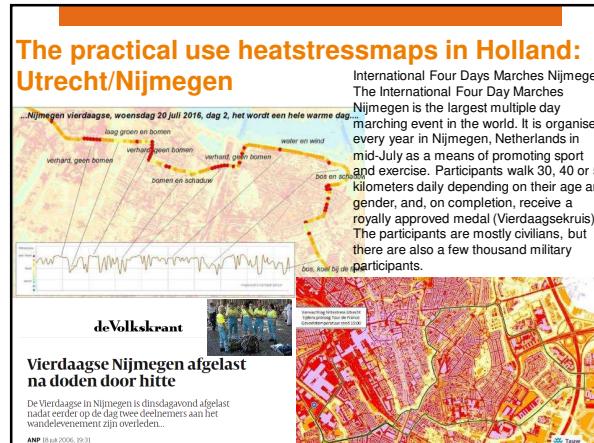
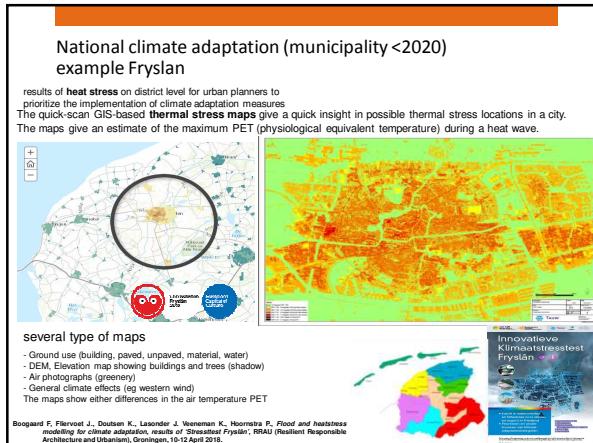
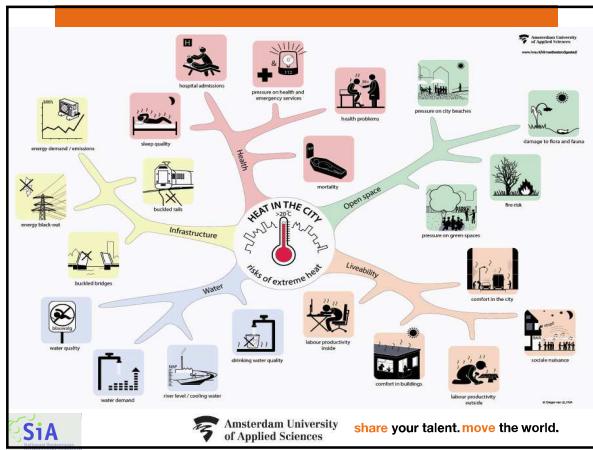


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Heat resilient city



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Asia: use of heatstressmaps

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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- Share best practices

Groningen 1992-2020 average
Tainan 1992-2030 average

Heatstress Tainan (Taiwan)
Heatstress map in Ayutthaya (Thailand)

Africa: Why Johannesburg? Focus area for climate change adaptation



Focus areas:
 Climate change adaptation governance
 Water scarcity
 Floods and stormwater
 Heat waves, human and environmental health
 Informal settlements and urbanisation
 Infrastructure

A large African city within the Gauteng City Region in which heat stress is already 'officially' acknowledged as one of the six focus areas for climate change adaptation (Climate Change Adaptation Framework (draft 2018, Prof. Coleen Vogel et al.)

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Why Johannesburg? Variety

Photo credit: Johny Miller, Unequal Scenes (Bloubosrand / Kya Sands)

Momentum: Rapid urbanization / densification, and busy with:
 Busy with [Open Space Planning plans](#),
 Busy with [Stormwater Design Manual](#),
 Starting with [Green Infrastructure Strategy](#)

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Needs for heat stress map: 'green, health, planning'

- Climate Change Adaptation manager:** "We need information to inform our [tree planting programme](#)"
- Researcher:** "Clinics in poor areas have higher number of illnesses during hot periods. Is this influenced by city fabric?"
- Large commercial developer:** "We are building a new city, are we adding to heat stress?"
- You?**

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First results

Legend
 2016 Air temperature difference with open rural areas in the current situation 2017
 Very much cooler
 much cooler
 Cool
 Air in open rural areas (2017)
 Little warmer
 Warmer
 Much warmer
 Very much warmer
 Endings (many are missing)

Legend
 2050 Air temperature difference with open rural areas in the current situation
 Very much cooler
 much cooler
 Cool
 Air in open rural areas (2050)
 Little warmer
 Warmer
 Much warmer
 Very much warmer
 Endings (many are missing)

First results: scenarios 2017-2050, AIR-PET

Legend
 2016 Air temperature difference with open rural areas in the current situation
 Very much cooler
 much cooler
 Cool
 Air in open rural areas (2017)
 Little warmer
 Warmer
 Much warmer
 Very much warmer
 Endings (many are missing)

Legend
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 Endings (many are missing)

- **Verication of the map:**
“heatscans, city climatescans and social media”
- **From analyse to act:**
“Climatescan, ‘climate in our street’, engagement with stakeholders.
- Example of engagement and verification

Verification of the map: "heatscans, city climatescans and social media"

Cityscan for climate adaptation
The wicked problem scan: example Rotterdam

The City Climate Scan methodology: to measure, map, scan and assess different parameters that provide insight into the vulnerability of urban areas and neighborhoods.

A317 City Scan Method

Challenge	Method
Urban Roads	Mapping: Roofs and infiltration measurements multimetered
ROTTERDAM	Dynamic measurements: air temperature on several surfaces in the urban dense area with heatwaves and rainfall
Urban watermanagement	Urban - Infiltration
	Innovative approaches in meeting rapidly changing circumstances in different socio-economic contexts Europe, Asia and Africa

Author/s: Rick Heilkoop, Rotterdam University of Applied Sciences, Netherlands

TS 828 Urban climate resilience European-African knowledge exchange toolbox:
www.climatescan.nl

Author/s: Floris Boogaard, Hanze University Of Applied Science, Netherlands

Conclusions, next steps

- Combined climate GIS maps (heat stress and urban flooding indicate vulnerable locations to the effects of climate change).
- Maps are quick-scan tools for urban planners who need to make early decisions.
- Measures to prevent flooding and to reduce urban heat can often be combined and carried out at the same time.
- In the European and Asian cities the tools have been proven useful and the maps will be applied in the African process with verification and engagement of stakeholders.
- Challenges and further developments: mapping other climate related issues in dense urban areas e.g. Africa.
- Work on this together?

THANK YOU...

**ANY
QUESTIONS?**

A317 City Scan Method

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