REASONS TO ADAPT TO URBAN HEAT (IN THE NETHERLANDS)

Lisette Klok
e.j.klok@hva.nl

ICUC9, Toulouse
HEATWAVE, THE NETHERLANDS
30TH JUNE – 5TH JULY 2015
HEATWAVE, THE NETHERLANDS
4TH JULY 2015 – TOUR DE FRANCE IN UTRECHT
THE PROBLEM

Dutch Delta Programme: *By 2050 the Netherlands must be as much climate-proof and water-robust as is possible.*

However, at the local (municipal) level, climate adaptation is not always obvious.

Local governments struggle with defining **the urgency of heat stress** and finding good arguments for the need to adapt to rising temperatures in urban environments.

http://english.deltacommissaris.nl/delta-programme
THE SOLUTION?

An *overview of arguments and facts* that support the need to adapt to urban heat.

Based on a literature study
- Scientific papers and reports
- Climate adaptation strategies
  …for the Netherlands, in Europe and outside Europe

Discussion with urban planners and professionals
REASONS AND FACTS IN THE NETHERLANDS
DUTCH DELTA PROGRAMME

*Built-up areas may be seriously disrupted by heat-stress in the future due to rising temperatures and the urban heat island effect.*

Severe impacts are:

- Comfort and liveability of cities
- Heat-related disease and mortality
- Hospital admissions
- Sleep quality
- Labour productivity
ROTTERDAM AND THE HAGUE

Further impacts:
• Comfort in buildings
• Energy- and water demand
• Flora and fauna
• Water quality
• Infrastructure
• Utilities, ICT networks and data centres

Positive consequences:
• Recreation near lakes and along the coast
• Use of outdoor spaces
HEAT-RELATED MORTALITY IN NL

• Mortality increases by 12% during a heat wave day ~ 40 extra deaths per day (Huynen et al., 2011)
• Heat wave in 2003 resulted in 1400 – 2200 excess deaths (Garssen et al., 2005)
• About 1000 people died due to the heat wave of 2006 (UNISDR, 2007).

Top 10 Natural disasters by number of deaths for 2006 (Source: UNISDR, 2007)

<table>
<thead>
<tr>
<th>Natural disaster</th>
<th>Country</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Earthquake, May</td>
<td>Indonesia</td>
<td>5,778</td>
</tr>
<tr>
<td>Typhoon Durian, December</td>
<td>Philippines</td>
<td>1,399</td>
</tr>
<tr>
<td>Landslide, February</td>
<td>Philippines</td>
<td>1,112</td>
</tr>
<tr>
<td>Heat wave, July</td>
<td>Netherlands</td>
<td>1,000</td>
</tr>
<tr>
<td>Heat wave, July</td>
<td>Belgium</td>
<td>940</td>
</tr>
<tr>
<td>Typhoon Bilis, July</td>
<td>China, P Rep</td>
<td>820</td>
</tr>
<tr>
<td>Tsunami, July</td>
<td>Indonesia</td>
<td>802</td>
</tr>
<tr>
<td>Cold Wave, January</td>
<td>Ukraine</td>
<td>801</td>
</tr>
<tr>
<td>Flash Flood, August</td>
<td>Ethiopia</td>
<td>498</td>
</tr>
<tr>
<td>Typhoon Samoai, August</td>
<td>China, P Rep</td>
<td>373</td>
</tr>
</tbody>
</table>
REASONS IN EUROPE
**Why are heatwaves an important challenge?** In Europe, of those natural disasters occurring in recent decades, heatwaves have caused the most human fatalities.

<table>
<thead>
<tr>
<th>Hazard type</th>
<th>Recorded events</th>
<th>Number of fatalities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storm</td>
<td>155</td>
<td>729</td>
</tr>
<tr>
<td>Extreme temperature events</td>
<td>101</td>
<td>77 551</td>
</tr>
<tr>
<td>Forest fires</td>
<td>35</td>
<td>191</td>
</tr>
<tr>
<td>Drought</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>Flood</td>
<td>213</td>
<td>1 126</td>
</tr>
<tr>
<td>Snow avalanche</td>
<td>8</td>
<td>130</td>
</tr>
<tr>
<td>Landslide</td>
<td>9</td>
<td>212</td>
</tr>
<tr>
<td>Earthquake</td>
<td>46</td>
<td>18 864</td>
</tr>
<tr>
<td>Volcano</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Oil spills</td>
<td>9</td>
<td>n/a</td>
</tr>
<tr>
<td>Industrial accidents</td>
<td>339</td>
<td>169</td>
</tr>
<tr>
<td>Toxic spills</td>
<td>4</td>
<td>n/a</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>928</strong></td>
<td><strong>98 972</strong></td>
</tr>
</tbody>
</table>

Overview of the major natural hazards in Europe between 1998 and 2009 (EEA, 2010).

In total, more than 70 000 excess deaths during the hot summer of 2003, and about 3000 in heat waves of 2006 and 2007.
EEA, 2012 - IMPACTS OF HEAT

- Mortality
- Human health
- Wellbeing
- Water supply
- Economy and infrastructure
- Changes in patterns of vector-borne diseases
The risk of overheating has only recently been recognized and is therefore relatively poorly understood and managed. Mapping overheating risk is more difficult than flood risk, as vulnerability varies from location–to-location, building-to-building and person-to-person.

Additional impacts:
- Increase in social inequality
- Increase in fire-risk of greenspaces

Number of excess deaths in England and Wales during 2003 heatwave in August is > 2000.
COPENHAGEN

More and heavier downpours and higher sea levels are the primary climate challenges.

Copenhagen very rarely presents periods of prolonged heat waves.

Impacts of heat:
• Quality of life
• Expenditure on energy consumption and health care
REASONS OUTSIDE EUROPE
EPA 2008 – REDUCING URBAN HEAT ISLANDS

Why do we care?
1. Increased energy consumption
2. Elevated emissions of air pollutants and greenhouse gases
3. Human health and comfort

Excessive heat exposure contributed to over 8,000 extra deaths between 1979 to 1999 in the US, exceeding the number from hurricanes, lightning, tornadoes, floods, and earthquakes combined.

Peak urban electricity demand increases about 3% for each °C in summertime temperature.
VANCOUVER

Relevant impacts:
• Health and safety of vulnerable populations
• Water supply
• Vectors for disease and respiratory illness

The heat wave of 2009 caused about 122 excess deaths in Vancouver and many emergency room visits.
MELBOURNE

The major heat risks:

- Heat stress related death and illness
- Stranded passengers as trains are delayed or cancelled in hot weather
- Energy blackouts
- Violence and anti-social behavior causing public nuisance and hospital admissions
- Maintenance costs of assets and infrastructure

From 1900 to 2011, 4555 deaths were attributed to extreme heat in Australia; more than the total of deaths from all other natural hazards (Coates et al., 2014).
CONCLUSIONS
AN OVERVIEW OF REASONS & FACTS....

Is this helpful to get the message across?
RECOMMENDATIONS IN BRINGING THE MESSAGE

• Focus on **local impacts**
• Couple the message to **recent events** or hazards
• Learn from adaptation strategies of **cities in warmer climates**
• Couple climate adaptation to **other political ambitions**
• ...