

## Spatial planning and resilience to climate change – the case of Rotterdam

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## Responses to climate change

### Adaptation and mitigation strategies

- often developed separately
- not always complementary
- 1990s: adaptation politically difficult – implied failure to tackle causes
- 2000s: 'resilience turn' – recognition that some impacts cannot be avoided even if GHG levels are reduced

## Flood risk in the Netherlands

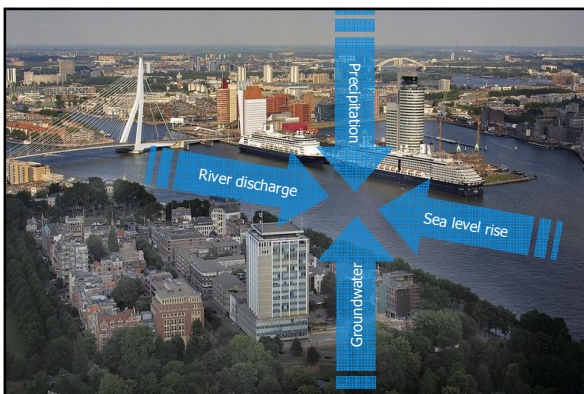


maximale waterdiepten

0.2 m	0.2 m water kunnen nog rijden
0.2 - 0.5 m	
0.5 - 0.8 m	lage voertuigen kunnen nog rijden
0.8 m - 2 m	nao ca. overstrooming laagste rijke
2 m - 5 m	zwaar laagste rijke
> 5 m	
	buitedijkt gebied

## Urban assets most exposed to flooding (2070)

Rank	Country	Urban Agglomeration	Exposed Assets Current (\$Billion)	Exposed Assets Future (\$Billion)
1	USA	Miami	416.29	3,513.04
2	CHINA	Guangzhou	84.17	3,357.72
3	USA	New York-Newark	320.20	2,147.35
4	INDIA	Kolkata (Calcutta)	31.99	1,961.44
5	CHINA	Shanghai	72.86	1,771.17
6	INDIA	Mumbai	46.20	1,598.05
7	CHINA	Tianjin	29.62	1,231.48
8	JAPAN	Tokyo	174.29	1,207.07
9	CHINA	Hong Kong	35.94	1,163.89
10	THAILAND	Bangkok	38.72	1,117.54
11	CHINA	Ningbo	0.26	1,073.93
12	USA	New Orleans	233.69	1,013.45
13	JAPAN	Osaka-Kobe	215.62	968.96
14	NETHERLANDS	Amsterdam	128.33	843.70
15	NETHERLANDS	Rotterdam	114.89	825.68
16	VIETNAM	Ho Chi Minh City	26.86	652.82
17	JAPAN	Nagoya	109.22	623.42
18	CHINA	Qingdao	2.72	601.59
19	USA	Virginia Beach	84.64	581.69
20	EGYPT	Alexandria	28.46	563.28



## The role of planning – leaving out mitigation?

"while spatial planning has something to contribute to the mitigation of climate change, the main challenge for planning is to help prepare for the impacts of climate change" (de Vries, 2006)

## The role of planning – leaving out mitigation?

"new urban scientific evidence suggests that planning's principal role in the fight against warming will be one of adaptation not mitigation" (Gleeson, 2008)

	Minimizing Probability	Minimizing Consequences	Stimulating Recovery
Region	<ul style="list-style-type: none"> <li>improved dikes</li> <li>new Delta plan</li> <li>cool recreational opportunities</li> </ul>	<ul style="list-style-type: none"> <li>compartmentalization between dikes</li> <li>flood risk maps</li> <li>early warning system</li> <li>evacuation plan</li> </ul>	<ul style="list-style-type: none"> <li>priority for recovery from societal disorder</li> <li>emergency shelters</li> </ul>
City	<ul style="list-style-type: none"> <li>de-hardened and greener surfaces</li> <li>public green and water zones</li> <li>rooms for innovative water storage</li> <li>avoid vulnerable functions in vulnerable areas</li> </ul>	<ul style="list-style-type: none"> <li>diversified public self-structure</li> <li>adapted traffic management during evacuations</li> <li>heat stress plan</li> </ul>	<ul style="list-style-type: none"> <li>priority for recovery of public space</li> <li>accommodation of heat stress victims</li> <li>water resilience fund</li> <li>backup energy and water systems</li> </ul>
District	<ul style="list-style-type: none"> <li>buildings integrated into dykes</li> <li>integrally heightened areas</li> <li>collective green gardens</li> <li>rain-water infiltration systems nearby</li> </ul>	<ul style="list-style-type: none"> <li>safe havens</li> <li>green walks</li> <li>elevated sidewalks</li> </ul>	<ul style="list-style-type: none"> <li>passive water drains</li> </ul>
Building	<ul style="list-style-type: none"> <li>green frontages</li> <li>permanent cooling options</li> <li>buildings on mounds</li> </ul>	<ul style="list-style-type: none"> <li>wet proof ground floors</li> <li>dry proof ground floors</li> <li>sun blinds</li> <li>self-reliance</li> </ul>	<ul style="list-style-type: none"> <li>availability of pumps</li> <li>wet proof decorations</li> </ul>

## Combining adaptation and mitigation in planning

- logic in combining adaptation and mitigation strategies?

turn to adaptation: "threatens to degenerate into an open-ended commitment to adapt to escalating climate change while failing to do enough to arrest it" (Howard, 2010)

## Combining adaptation and mitigation in planning

- logic in combining adaptation and mitigation strategies?
- competition for resources
- tensions (e.g. higher density development)
  - + transport, district heating
  - heat island effects, cooling requirements
- fundamental differences between adaptation and mitigation
  - actors
  - spatial scales
  - timescales of implementation and impact