Multi-level Governance for Climate Change Adaptation in Delta Urban Regions

Marcin Dąbrowski

Urban Management Tools for Climate Change
IHS, Erasmus University Rotterdam, 15 June 2017
Outline

Background

Some key concepts

The Randstad: Rotterdam and The Hague

Pearl River Delta:
   a. Hong Kong
   b. Guangzhou and Shenzhen

Conclusions
1. Background
• A problem that is both **global and local** in nature (‘glocal’) → need responses at **multiple administrative levels** (Gupta, 2007)

• A particularly complex problem → need **integrated policy** action (water, planning, housing, health, disaster management, research, etc.)

• Cities are **perpetrators** of climate change but also their main **victims** too and part of the **solution**
Delta urban regions particularly vulnerable to climate change:
- Tension between the natural environment and intensive urbanisation – urbanisation increases vulnerability
- Rising sea levels particularly dangerous for low-lying areas
- Prone to river flooding
- Damage of infrastructure and other physical assets from extreme weather events → costly and harmful for the economic activity, which tends to be concentrated in deltas
- Threat to the dense population living in deltas
- Public health implications of higher average temperatures
- Stress on water resources, etc.
Obstacles to implementation of urban climate change policies:

- **Institutional blockage** - clashes of interests and priorities across the departments of sub-national authorities
- **Mismatch of priorities** across the levels of governments
- **Insufficient capacity** and expertise
- **Lack of appropriate funding** to reach national targets
- **Lack of devolved authority**, appropriate responsibility and/or financial autonomy
- **Difficult co-ordination between municipalities** within metropolitan and functional areas

(Gupta, 2007; Corfee-Morlot et al., 2009, Betsill and Bulkeley, 2007)
1. How does climate change affect the cities in which you live and work? Which population groups are the most affected?

2. Does the city recognise the problem? Does it take adaptation measures? If yes, are they framed as climate adaptation or something else?
2. Conceptual framework
• **Multi-level governance (MLG)** as a conceptual framework – recognising interdependencies and across scales (e.g. Hooghe and Marks, 2001; Hooghe et al. 2010)

  – **Vertical dimension** – to implement national climate adaptation strategies, the governments need to cooperate with regional and local governments as agents of change, while cities’ actions are ‘nested’ in legal and institution frameworks at higher scales

  – **Horizontal dimension** – international networks and inter-jurisdictional cooperation on climate change adaptation to exchange knowledge, pool resources and address cross-boundary issues (Corfee-Morlot et al., 2009; Bulkeley and Betsill, 2005)
MLG Type I

Supranational authority

Central government

Regions / Provinces

Sub-regional authorities

Municipalities

Civil society

Private sector
MLG Type I
Relativity, by M. C. Escher. Lithograph, 1953.
• **MLG Gaps** – discrepancies between priorities, capacity issues, etc. (OECD, 2010)

• **Boundary spanning** – to deal with the complexity of climate adaptation policy one needs to span boundaries between:
  - **Levels** of government and geographical **scales**
  - Policy **sectors**
  - Administrative **units**
  - **Societal** groups
  - **Time** (short VS long term)

• **Institutions, Ideas, Interests** – a perspective to understand the difficulties in spanning those boundaries / bridging the MLG gaps

• **Q: What are the governance challenges that constrain urban climate change adaptation policy?**
Randstad (South Wing): Rotterdam and The Hague

Pearl River Delta: Hong Kong, Shenzhen, Guangzhou
Risky parking in unembanked areas

Let op! kade bij extra hoge waterstand onder water

Photo: Marcin Dąbrowski
Flooding in the unembanked areas of Dordrecht, 5 Jan 2012

Photo: Robin Utrecht / AFP – Getty Images
Maas spilling over in Noordereiland, Rotterdam

Photo: www.nufoto.nl
Flooding in Shenzhen (2014), Hong Kong (2009), Guangzhou (2010)

Source: Reuters

Source: CCTV

Photo: TVB

Photo: Eddie Tse
<table>
<thead>
<tr>
<th></th>
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<tbody>
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<td>Jakarta</td>
<td>513,000</td>
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Table 1: Top 20 cities ranked in terms of population exposed to coastal flooding in the 2070s (including both climate change and socioeconomic change) and showing present-day exposure
<table>
<thead>
<tr>
<th>Rank</th>
<th>Country</th>
<th>Urban Agglomeration</th>
<th>Exposed Assets Current ($Billion)</th>
<th>Exposed Assets Future ($Billion)</th>
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<tbody>
<tr>
<td>1</td>
<td>USA</td>
<td>Miami</td>
<td>416.29</td>
<td>3,513.04</td>
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<td>CHINA</td>
<td>Guangzhou</td>
<td>84.17</td>
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<td>USA</td>
<td>New York-Newark</td>
<td>320.20</td>
<td>2,147.35</td>
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<td>INDIA</td>
<td>Kolkata (Calcutta)</td>
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<td>Shanghai</td>
<td>72.86</td>
<td>1,771.17</td>
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<td>Mumbai</td>
<td>46.20</td>
<td>1,598.05</td>
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<td>CHINA</td>
<td>Tianjin</td>
<td>29.62</td>
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<td>Tokyo</td>
<td>174.29</td>
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<td>CHINA,</td>
<td>Hong Kong</td>
<td>35.94</td>
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<td>CHINA</td>
<td>Ningbo</td>
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<td>USA</td>
<td>New Orleans</td>
<td>233.69</td>
<td>1,013.45</td>
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<td>JAPAN</td>
<td>Osaka-Kobe</td>
<td>215.62</td>
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<td>NETHERLANDS</td>
<td>Amsterdam</td>
<td>128.33</td>
<td>843.70</td>
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<td>825.68</td>
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<td>EGYPT</td>
<td>Alexandria</td>
<td>28.46</td>
<td>563.28</td>
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</table>

*Table 2: Top 20 cities ranked in terms of assets exposed to coastal flooding in the 2070s (including both climate change and socioeconomic change) and showing present-day exposure (Source: Nicholis et al (2007), OECD, Paris)*
Figure 8: Impact of all perils by metropolitan area – Top 10

The chart includes the aggregate number of people potentially affected by all relevant perils (bubble size) and global rankings by the value of working days lost, in absolute terms (x-axis) and in relation to the country’s national economy (y-axis). Residents are counted multiple times when affected by more than one peril because each peril is accounted for individually.

Source: Swiss Re, 2014
### Table 1 | City ranking by risk (AAL) and relative risk (AAL in percentage of GDP) for 2005.

<table>
<thead>
<tr>
<th>Ranking by AAL (US$ million)</th>
<th>Ranking by relative AAL (percentage of city GDP)</th>
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</thead>
<tbody>
<tr>
<td>Urban agglomeration</td>
<td>100 year exposure</td>
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<tr>
<td>Guangzhou</td>
<td>38,508</td>
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<td>Miami</td>
<td>366,421</td>
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<td>New York—Newark</td>
<td>236,530</td>
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<td>New Orleans</td>
<td>143,963</td>
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<td>Mumbai</td>
<td>23,188</td>
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<tr>
<td>Nagoya</td>
<td>77,988</td>
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<td>Tampa—St. Petersburg</td>
<td>49,593</td>
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<td>Boston</td>
<td>55,445</td>
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<tr>
<td>Shenzhen</td>
<td>11,338</td>
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<tr>
<td>Osaka—Kobe</td>
<td>149,935</td>
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<td>Vancouver</td>
<td>33,456</td>
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<tr>
<td>Tianjin</td>
<td>11,408</td>
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<td>Ho Chi Minh City</td>
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<td>Kolkata</td>
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<td>Guayaquil</td>
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<td>Philadelphia</td>
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<td>Virginia Beach</td>
<td>61,507</td>
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<tr>
<td>Fukuoka—Kitakyushu</td>
<td>39,096</td>
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<tr>
<td>Baltimore</td>
<td>14,042</td>
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<tr>
<td>Jakarta</td>
<td>4,256</td>
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</table>

A comparison with a ranking by exposure is proposed in the Supplementary Information.

Source: Hallegate et al. 2013
3. The Randstad: Rotterdam and The Hague
Areas exposed to flooding as a result of the rising sea level

Source: Sea Level Rise Explorer
Climate change programmes and strategies

- National:
  - Delta Programme:
    - Objective: update and adapt the national flood protection and fresh water supply policies in the context of climate change
    - Delta Fund - 1 billion EUR per year for implementation
  - Knowledge for Climate – a research programme
  - Room for the river – investment in measures to create more space for the water to mitigate flood risk

- Regional/local:
  - Rotterdam Climate Proof - adaptation (and mitigation) programme to improve the climate resilience by 2035, while enhancing the city’s spatial quality and promote economic development
  - Stadsregio Rotterdam adaptation strategy – regional programme of Rotterdam + 5 municipalities
  - Haaglanden Waterproof – regional programme coordinated by the Haaglanden city-region
Oosterschelde, Zeeland
Photo: rws.nl
Maeslant storm surge barrier protecting Rotterdam

Photo: Marcin Dąbrowski
Maeslant storm surge barrier protecting Rotterdam

Photo: waterschappen.nl
Benthemplein, Rotterdam (water plaza)

Photo: Marcin Dabrowski
Benthemplein, Rotterdam (water plaza)

Photo: Marcin Dabrowski
Water plaza in Rotterdam
Photo: Marcin Dąbrowski
Floating pavilions in Rotterdam

Photo: Marcin Dąbrowski
Dakpark. Multi-functional flood protection in Rotterdam.

Photo: Marcin Dąbrowski
Urban garden, Feijenoord, Rotterdam

Photo: Marcin Dabrowski
Multi-functional dike in Scheveningen

Photo: www.nrc.nl
Boskalis dredging ship building the Sand Engine in The Hague.

Photo: www.dezandmotor.nl
Sand Engine in July 2011

Photo: www.dezandmotor.nl
Sand Engine in Sept 2014
Photo: www.dezandmotor.nl
### Actors

<table>
<thead>
<tr>
<th>State</th>
<th>Non state</th>
<th>Knowledge</th>
<th>Beyond NL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Municipalites – the key actors</td>
<td>Maritime business (dredging, hydraulic engineering)</td>
<td>Universities</td>
<td>EU– guidelines, funding</td>
</tr>
<tr>
<td>Port authorities</td>
<td>Energy companies</td>
<td>Research institutions</td>
<td>Belgian Flanders</td>
</tr>
<tr>
<td>City-regions – coordinating strategies of municipalities</td>
<td>Environmental NGOs</td>
<td>Cross-sectoral think tanks</td>
<td></td>
</tr>
<tr>
<td>A myriad of deliberative and cooperative bodies, multi- and single-purpose; e.g. Monitoring Committees for the Delta Programme</td>
<td>Housing associations (semi-public)</td>
<td></td>
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<tr>
<td>Waterboards – an additional layer of sub-national government for managing flood protection infrastructure</td>
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<td>Safety regions – disaster management</td>
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<td>Provinces – planning and coord.</td>
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<td>Rijkswaterstaat - national water authority</td>
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<td>Ministry of Infr. and Env.</td>
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</table>
Institutions

• The **resourceful municipalities** (e.g. Rotterdam) and **city-regions** (Haaglanden) are the **key actors**, but **smaller municipalities** lack capacity and funding (austerity and ‘shrinking state’)

• **Polder model can prevent effective decision-making** – need to consult everyone and ensure broad consensus – joint decision trap?

• **General complexity** of governance arrangements rendering cooperation laborious and time consuming

• **Mismatch between the boundaries** of sub-national bodies - provinces, waterboards, safety regions, regions for the purpose of adaptation policy (Delta programme)
Institutions

• Policy is in flux because the administrative system is in flux (decentralisation reforms and merger of city-regions) – uncertainty

• Fragmented responsibility for flood risk – Coastal flooding is a national responsibility, but river flooding is that of the regional waterboards, while pluvial flooding is the task of the municipalities. All those three types of flooding can coincide and vulnerability to them increases as a result of climate change → strong case for coordination

• Blurred accountability for unembanked areas – legal grey zone
Unembanked areas in Rotterdam
Unembanked areas (orange) in the Rotterdam region, 2014

Source: A. Nillesen (TU Delft)
Unembanked area, Feijenoord, Rotterdam

Photo: Marcin Dabrowski
Unembanked area, Noordereiland, Rotterdam

Photo: Marcin Dabrowski
Ideas

• Historically rooted centrality of water management – key for state building and the very existence of a large part of the Dutch territory → focus on water (adaptation), water boards are one of the key actors

• As a result climate adaptation focuses almost exclusively on flood risk management issues, neglecting other impacts of the climate change such as urban heat islands, salinisation of soil, droughts.

• Paradox: too much trust in the long established flood protection system limits awareness of the threat and undermines public support for adaptation policies. The new ‘soft’ water storage solutions can play an important role in building awareness
• **Difficult cooperation between municipalities and waterboards** due to different approaches and ways of doing things:
  - Waterboards reluctant towards new experimental ‘soft’ solutions to store water in cities (water plazas, green roofs), preferring traditional hydraulic engineering solutions
  
  • Waterboards not used to consider spatial and social impacts of the water safety infrastructure

  • Municipalities are **general purpose jurisdictions** with a broad array of responsibilities (social welfare, spatial quality, housing, etc.) and limited knowledge on flood risk management, however, some of them are keen to experiments to **combine flood protection with enhancing quality of life** (e.g. multi-functional dikes, enhancing blue-green spaces in cities to enhance water storage while providing recreational space);

  • However, cooperation is increasingly close.
Interests

- Difficulties in **encouraging business** to take part, but some successes, e.g. Rotterdam brands itself as a resilient water city and leader in tackling climate change, while the marine industry can showcase its capacity to the world.

- **Who pays** for infrastructure to protect unembanked areas and experimental adaptation measures in cities?

- Who takes **responsibility** (floods, unembanked areas, heat-related deaths, etc.)?

- Adaptation requires **substantial investment in mitigating a risk that is distant and largely ignored by the public**, while the local leaders operate according to a four year **electoral cycle** and are under pressure to cater to other societal interests.

- Climate adaptation as a **place branding and business promotion strategy** – how effective actually are the measures taken so far? What is behind the positively loaded discourse?
1. What are the main challenges encountered in adapting to climate change in your cities? What boundaries need spanning?

2. What is needed to overcome them?

3. Examples of good practice from your cities?
1. What are the main challenges encountered in adapting to climate change in your cities? What boundaries need spanning?

2. What is needed to overcome them?

3. Examples of good practice from your cities?
4. Pearl River Delta: Hong Kong
Areas exposed to flooding as a result of the rising sea level

Source: Sea Level Rise Explorer
Source: Jeffrey Linn via thenanfang.com
33°C+

More very hot days and hot nights

Fewer rain days but average rainfall intensity will increase

More extreme rainfall events

More extremely wet years but risk of extremely dry years will remain

Global sea level rise will lead to coastal changes all over the world, including Hong Kong

Threat of storm surges associated with tropical cyclones will rise

Source: Hong Kong Environment Bureau, Hong Kong Observatory
Source: Hong Kong Environment Bureau, Hong Kong Observatory
<table>
<thead>
<tr>
<th>Return period (year)</th>
<th>Extreme sea level above Chart Datum (m)</th>
<th>Historical Typhoons bringing significant storm surges to Hong Kong (Maximum sea level above Chart Datum at Victoria Harbour)</th>
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<tr>
<td></td>
<td>Current</td>
<td>Sea level rise reaching 0.26m in 2021-2040</td>
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<td>1</td>
<td>2.7</td>
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</table>

Projected changes in return values of extreme sea level events in 2021-2040, 2046-2065 and 2081-2100 under the high GHG concentration scenario

Source: Hong Kong Environment Bureau, Hong Kong Observatory
Climate change programmes and strategies

- Hong Kong Observatory (2010) Sea-level rise and storm surge - impacts of climate change on Hong Kong → very clear and precise data on climate change threats, that is hardly taken up by the government

- Environment Protection Department (2010) A Study of Climate Change in Hong Kong - Feasibility Study (focus on mitigation)

- However, recognition of the climate change impacts by the government and ongoing efforts across various government departments to update standards and procedures in the wake of the rising sea level and more frequent extreme weather (e.g. for drainage, coastal infrastructure, land reclamation)

- Hong Kong Climate Change Report 2015 – mitigation and adaptation actions outlined, but still falls short of being an integrated strategy

- More and more examples of adaptation measures, which however remain ‘accidental’ and are not part of integrated strategies
Drainage Master Plan Review Studies
(On-going, since 2008)

Study areas:
- **Completed**
  1. Yuen Long
  2. North District
  3. Happy Valley

- **On-going**
  4. West Kowloon
  5. East Kowloon
  6. Tai Po
  7. Shatin & Sai Kung
  8. Northern Hong Kong Island

- **Planning**
  9. Lautau Island & Islands
  10. Tsuen Wan, Tuen Mun & Tsing Yi
  11. Tseung Kwan O
  12. Southern Hong Kong Island

Source: Hong Kong Environment Bureau, Hong Kong Observatory
Demountable flood barrier in Tai O Village

Photo: Landezine.com
Multi-functional Sheung Wan underground storage tank and pumping station
Underground water storage tank under Happy Valley race track
### Actors

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<tr>
<th>State</th>
<th>Non state</th>
<th>Knowledge</th>
<th>Beyond HK</th>
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<tbody>
<tr>
<td>Hong Kong Government departments of Environmental Protection, Drainage Services, Civil Engineering and Development, Water Resources</td>
<td>Transportation and utilities businesses</td>
<td>Universities and research institutions provide knowledge on climate change impacts and are involved in adaptation studies</td>
<td>Hong Kong/Guangdong Joint Liaison Group on Combating Climate Change</td>
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<td>Environmental NGOs (e.g. WWF)</td>
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<td>C40 Cities (focus on mitigation)</td>
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<td>Business associations</td>
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</table>
Institutions

Small and ‘insular’ government – not dealing with higher or lower scales of government

Wealth of engineering and scientific expertise, availability of data on climate change impacts

Silo-mentality deeply embedded in the efficient but reactive and stiff post-colonial administration – no coordination on climate change adaptation, only routine operational interactions

Planning Department focused on zoning and permits rather than on strategic planning – sidelined from discussions on adaptation

Blurred accountability for tackling coastal flooding – Drainage Services Department deals with flood risk generally, but coastal flooding is beyond its jurisdiction, while the Civil Engineering and Development Department deals with coastal infrastructure but not storm surges
Ideas

• Low (but growing) awareness of the climate change impacts

• However, short term thinking is the norm – legacy of colonial rule and the focus on making money

• Engineering-focused management in government departments tends to favour short term techno-fixes

• Perception of typhoons and the related flooding as something normal and inevitable, hence focus on draining the excess water and warning systems rather than on preventing storm surges and extreme weather

• NGOs are influential in setting the tone of the debate on climate change – conferences, consultations, ex-NGO under-secretary of the state in the Environmental Bureau
• No real cross-border cooperation on this issue due to ressentiment towards Mainlanders

• Complacency stemming from excessive trust in the drainage and slope control infrastructure massively developed recently

• Occupy Movement and the constitutional crisis – low legitimacy of the government further hinders long-term thinking and grand visions – focus on daily business
**Interests**

- **Business-orientated government** avoids imposing policies that would generate costs for businesses

- **Some particularly vulnerable businesses lead the way** (MTR, energy companies) in climate adaptation measures to protect their assets and reduce risks
5. Pearl River Delta: Guangzhou and Shenzhen
Source: www.epd.gov.hk
Source: Yuting Tai, TU Delft
Nansha, Guangzhou

Source: architectus.com.au
Climate change programmes and strategies

- Recognition of the need to take adaptation measures at the national level, trickling down to the provincial level, but no local response:
  - National Plan for Coping With Climate Change 2011-2020 – focus on mitigation, but urban adaptation measures mentioned

- Provincial Climate Change Adaptation Strategy, 2010 – document not taken up by the municipalities

- Sponge City Programme, 2014 – national programme for making cities more ‘water proof’ and prevent waterlogging, Low Impact Development ideas, climate change not mentioned – Shenzhen is one of the pilot cities

- Guangzhou Water White Paper 2013 – climate change not mentioned

- However, at the local level, some water management and urban development projects would tick the box of urban climate change adaptation, but are not labeled as such
Combining urban redevelopment with flood protection on the South bank of the Pearl River in Liwan district, GZ

Photo: Marcin Dąbrowski
Reopened canals combine heritage protection, with enhancing spatial quality and resilience to surface flooding in Liwan district, GZ.

Photo: Marcin Dabrowski
Haizhu lake – a (flawed) hydrological project with a key role in the future development of Guangzhou’s city centre (extension of the ‘Axis’).
Haizhu lake – a (flawed) hydrological project with a key role in the future development of Guangzhou’s city centre (extension of the ‘Axis’).
Tianhe Wetland Park.
Pilot ‘Sponge City’ project in Guangzhou
Qianhai New Town, Shenzhen, build on reclaimed land with blue-green infrastructure to store water and mitigate storm surges.
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<th>State</th>
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<th>Knowledge</th>
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<td>Municipalities and their sectoral departments reflecting the higher scale administrative hierarchy – no activity in climate change adaptation</td>
<td>NA</td>
<td>Universities and research institutions involvement limited to design of new districts</td>
<td>Hong Kong/Guangdong Joint Liaison Group on Combating Climate Change</td>
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<td>Inter-municipal cooperation arrangements – no activity in climate change adaptation</td>
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<td>C40 Cities (Shenzhen – low-carbon city focus)</td>
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<td>Guangdong Province – climate change adaptation strategy (window-dressing)</td>
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<td>Pearl River Water Resources Commission - no activity in climate change adaptation</td>
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<td>Ministries of Land &amp; Resources, Water Resources, Housing &amp; Urban-rural Development, Environmental Protection – piece meal measures to address the national strategy</td>
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<td>National Development and Reform Commission – key actor defining the national climate change policy</td>
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<td>National Response Leading Group on Climate Change (headed by Chinese Premier)</td>
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Institutions

- **Hierarchical system with a Chinese specificity** – replication of departments across the scales and (in theory) a policy transmission belt from central to local, but in practice local level has large degree of autonomy and the central government little means of enforcing implementation.

- In theory different municipal bureaus coordinate actions to ensure flood safety, in practice **complete silo-mentality and lack of coordination**, not only lack of dialogue but also examples of counterproductive actions (transport bureau vs water resources bureau in the case of Haizhu lake).

- No continuity of urban policies – **Mayors ‘parachuted’** from elsewhere to be later promoted to the provincial or national level.
Ideas

- **Living with water is in the local DNA**, however, the ancestral knowledge in with water management has been lost.

- **Short-term thinking** is the norm – legacy of the rapid economic transformation; built environment not made to last.

- As in HK, **typhoons and the related flooding seen as normal and inevitable** → focus on draining the excess water and warning systems rather than on preventing calamities from happening.

- **No awareness of climate change impacts** – only academic hydraulic engineering experts seem to grasp it, but have hardly any influence on policy. Consequently, the cities **expand extremely fast into areas that are extremely vulnerable to coastal flooding ignoring the risks** – e.g. Nansha New Area in Guangzhou or Qianhai in Shenzhen.
Ideas

- No knowledge or dismissal of international studies on climate change impacts among the decision-makers.

- ‘Accidental’ climate adaptation measures that are not framed as climate change adaptation and not based on assessment of future risks – the objective is to create a beautiful urban landscape (‘every Mayor wants a lake in his district’).

- Sponge City programme introduces the concept of Low Impact Development (Shenzhen mainly, but ideas spill over across the region).

- No real cross-border cooperation on this issue due to resentment towards HK – vague exchange of knowledge.
Interests

- **Urbanisation at break-neck speed and at all cost → flood risk management is not a priority** (developing real estate is) and lags behind, resulting in very low level of flood protection:
  - About 77% is protected with 1-in-20 years (or below) and many core city areas (e.g. in Tianhe, Liwan, Baiwan, Haizhu) are currently only equipped with less than 1-in-10 years or 1-in-1 year protection measures

- No local response to the national climate change policy – focus on urban expansion and development, **environmental concerns are secondary, not to mention climate change adaptation**

- **Peculiarity of the assessment of local officials** – focus on GDP growth as the main indicator of performance and no interest of the leaders to do anything else (eying promotion to Beijing), unless better water management becomes a national priority in a particular area (see Sponge City policy)


**Interests**

- **Interest in boosting the value of real estate** dictate the use of multi-functional flood-protections and Low Impact Development solutions rather than environmental or climate adaptation concerns.

- **Impressing high level visitors** by pleasant water landscape features.

- **Extremely difficult collaboration between the cities** prevents any cooperation on issues other than transportation.

- Focus on economic growth and **limited availability of rural land that can be converted into urban** justifies the expansion of the cities onto reclaimed land (see Nansha, Qianhai new areas).
Conclusions
• **Urbanisation patterns and climate change vulnerability are closely connected**, if not readily recognised by decision-makers

• **Administrative system and national institutional characteristics are fundamentally important** factors determining how cities and urban regions address the climate change challenge

• **Acknowledging the interdependencies across scales** is essential for explaining why climate change risks are addressed (or not) by them and how

• **Cross-level, inter-jurisdictional and cross-sectoral governance challenges and accountability gaps** constraining climate adaptation capacity identified in both urban regions, albeit of different kind and magnitude
A closer look reveals essentially **similar flood protection / urban development projects** implemented in the different cities, however, their aims and framing vary greatly

**Implications for practice:**
- Climate risks awareness-building is urgently needed to build support for investment in adaptation, both NL and CN

- Framing climate adaptation measures as an opportunity to improve spatial quality and attractiveness of the city could stimulate the development of adaptation measures - the question is who benefits then?

- Improving vertical and horizontal coordination is the essential ingredient for making delta cities climate proof

- A degree of pragmatism needed – work around institutional limitations with the existing strengths and opportunities
Some further reflections

- Climate adaptation as a city branding strategy for Rotterdam – What is behind the discourse? What is the actual effectiveness of the measures implemented in the city?

- Importing multi-functional flood protection solutions and international best practice in water management and Low Impact Development to Shenzhen and Guangzhou, without any consideration for climate change impacts, but rather to make the new districts more attractive and maximise profits on real estate sales – a case of policy transfer in which imported solutions serve a completely different purpose as intended.

- Who benefits from adaptation measures, who loses out, what are the possible negative effects (risk of maladaptation)?

- Embracing the past? Scope for learning from past solutions to co-exist with water.
Thank you.