

# Concepts and tools for design of urban water policies for climate adaptation: a comparison

Joost Burman  
Olivia Jensen, Sreeja Nair, Joon Chuah

INSTITUTE of WATER POLICY

## Introduction

- Climate adaptation is a complex policy problem:
  - Requires formulation of policies with potentially long-term consequences.
  - Incomplete knowledge and uncertainty due to incomplete information and multiple interpretations and perspectives.
- Considerable number of research studies addressing climate adaptation in cities → development of concepts and tools.
- Policy documents start to mention concepts and tools.

## Research questions and method

- Questions:
  - To what extent are concepts and tools being applied in policy design?
  - How are concepts and tools being used by policy-makers?
  - Are there differences between different cities?
- Method:
  - Comparative case studies: Singapore, London and Rotterdam
  - Review of policy documents, newspaper articles and interviews

## Concepts

- Resilience, adaptation, flexibility, uncertainty, robustness, liveability, climate-proof, etc. → focus on **resilience thinking in policy design**.
- Academic discussions on what resilience means: engineering resilience, ecological resilience, evolutionary resilience.
- Policy documents usually do not explicitly define resilience.
- Resilience principles for policy design and investment planning:
  - Governance:
    - Holistic “whole systems” approach
    - Attention for recovery capacity
    - Future resilience
  - Investment planning:
    - Use of tools and methods to deal with uncertainty

## Tools and methods to deal with uncertainty

- Adaptive Policy-Making, Adaptation Pathways, Adaptation Tipping Points
- Robust Decision Making
- Real Options Analysis
- “Traditional” tools and methods:
  - Cost Benefit Analysis
  - Cost Effectiveness Analysis
  - Scenario Analysis
  - Sensitivity Analysis

## Main issues in water policies for climate adaptation

	Singapore	London	Rotterdam
Droughts	Longer periods of extreme drought could affect water supply, though current system is diversified and robust.	New resources needed; more severe droughts could lead to water use restrictions.	Subsidence and water quality issues during drought.
Coastal and Riverine Floods	Sea level rise could affect low-lying areas and coastal fresh water reservoirs and reduce drainage capacity.	Sea level rise and storm surges could increase coastal flooding probability.	Sea level rise and increasing rainfall could increase the flooding probability.
Surface Floods	Increasing intensity of tropical downpours could result in more flash floods.	More intense storm events could cause combined sewer overflows and localised flooding.	Due to climate change the city may need to deal with heavier rainfall in a shorter time.

## Governance I: Domains and spatial levels

	Singapore	London	Rotterdam
Coordination across domains	Coordination through NCCS and IMCCC, water responsibility of one agency, coastal defence coordinated by one agency.	Responsibilities highly fragmented, at different levels and across private and public parties. Oversight at the ministerial level; ad hoc coordination at lower levels of government	Consultation structure Climate & Water: administrative, management groups project teams, etc. (regional and local; in Water Plan), Rotterdam Climate Initiative, Delta Programme (national)
Spatial: hierarchical	Only one government level.	Different relations for different fields: national-local for flooding; river basin for water resource management	Coordination through Delta Programme and as above
Spatial: collaboration	No spatial subdivisions.	Collaboration between water utilities on water resource management supported by regulator; Environment Agency responsible for coordinating flood management.	Regional collaboration through water boards and as above

## Governance II: Stakeholders

	Singapore	London	Rotterdam
Public consultation	Consultation with representatives of the people and private sector. Agencies and ministries represent interests.	Extensive public consultation on new laws, regulations and major infrastructure investments and spatial plans	Multi-stakeholder partnerships, Rotterdam Climate Initiative
Role of private sector	Limited: private sector has own responsibility. Flood insurance part of property or car insurance.	Water supply by private firms overseen by regulator, large role insurance companies for flood risks.	Creation of public-private partnerships. No flood insurance
Advisors	Extensive use of consultancies, some academic support	Extensive use of consultancies, some academic support	Academic support (e.g. "Knowledge for Climate" program), consultancies

## Investment Planning (Tools and Methods)

	Singapore	London	Rotterdam
Standard approach	Not in the public domain; likely CEA for measures proposed by agencies and ministries, more elaborate analysis ad hoc, based on project size	CEA when investment concern compliance with EU or national regulations, CBA for other projects and ad hoc. Analysis "proportionate" to the size of investment.	CBA, proposed projects and Water Plan
Use of "new" tools	Adaptation pathways for coastal defence and critical infrastructure (on-going).	Real Options Analysis for Thames Tideway; Decision Pathways for Thames Estuary 2100.	Use in research projects to support investment decisions; not sure if used for actual decision.

## Discussion

- Path dependency and institutional embedding → climate adaptation is mostly an additional dimension in existing policy design.
- Concepts and tools are used for strategic decisions and plans.
  - Tools, consultants, etc. can be complex and expensive to use, so not for lower level decisions
  - Does that mean that resilience is only pursued at the national level?
- Policy makers want concrete recommendations, not familiar with analytical methods to deal with uncertainty and cannot interpret the results.

## Conclusions

- Concepts and tools for design of urban water policies for climate adaptation are slowly being used, though tensions exist:
  - Methods for policy design under uncertainty are sometimes difficult to build into standard approaches to policy appraisal.
  - Rigidities are imposed by the existing legal and regulatory framework and existing governance structures.
  - Budget/resource constraints.
  - Pressure on policy-makers to show that they take appropriate action in the short-term.