

WATERSCAPES IN TRANSFORMATION

Water Utilities and Sustainable Urban Drainage Policies

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PART I. GENERAL RESEARCH

INTRODUCTION

RESEARCH CONTEXT

Urbanisation and soil sealing have altered stormwater circulation in cities. Impermeable surfaces reduce infiltration, increase runoff and place growing pressure on conventional drainage systems, while climate change intensifies these pressures through more frequent and severe extreme events. **Conventional drainage** treats stormwater as a technical problem to be removed rapidly through underground sewers and grey infrastructure. **Sustainable urban drainage** instead retains, infiltrates, evaporates, reuses and conveys water through surface-based and blue-green systems. This shift changes water circulation and affects urban planning, public-space design, financing, maintenance and organisational responsibilities.

RESEARCH PROBLEM

Research on sustainable urban drainage often focuses on hydraulic performance, environmental benefits and technical design, paying less attention to the **policy and planning processes** through which interventions are formulated, financed, implemented and maintained. The transition requires **coordination** across water management, climate adaptation, spatial planning and public-space management, with responsibilities distributed among utilities, municipalities, regulators and other organisations. **Water utilities** may therefore move beyond managing water and sewer networks. Through their technical knowledge, financial resources, infrastructural responsibilities and relations with municipalities, they can contribute to problem definition, policy formulation, planning and spatial transformation.

RESEARCH AIM AND QUESTION

This research investigates how **relationships between water utilities and municipalities** shape sustainable urban drainage policy processes and the urban waterscapes produced through them. It examines how authority, responsibilities, knowledge, financial resources and implementation capacities are distributed among the actors involved. It also investigates how these governance configurations are formed and transformed during **policy formulation and implementation**, and how policy decisions are translated into plans and projects.

R.Q. How do the relationships between water utilities and municipalities, and the conditions under which these relationships operate, shape urban waterscapes through sustainable urban drainage policies?

RESEARCH DESIGN, DATA AND METHODS

RESEARCH DESIGN

The research adopts a **qualitative multi-case** design based on **within-case analyses** of Copenhagen, Lombardy, and Berlin, examined through a common framework. Since the cases differ in institutional setting, policy maturity and approaches to sustainable drainage, they are not treated as equivalent comparative units. The cases are treated as independent policy process with distinct territorial, institutional, regulatory and temporal boundaries. Findings are synthesised across common dimensions to identify recurring and case-specific mechanisms and relationships.

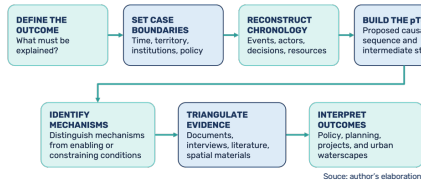
DATA



METHODS

Explaining-outcome Process Tracing. The analysis defines the outcome and the case's temporal, institutional, territorial and policy boundaries, then reconstructs a timeline of relevant events and actors. A **Process Theory of Change** structures the causal sequence from problem emergence to formulation, adoption, implementation and spatial outcomes.

METHODOLOGY APPLIED



THEORETICAL FRAMEWORK

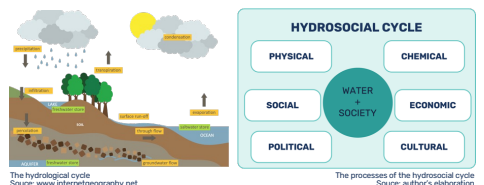
SUSTAINABLE URBAN DRAINAGE AS A POLICY AND PLANNING PROCESS Sustainable urban drainage is examined as a **public-policy and planning process** rather than a technical approach. The analysis considers how stormwater becomes a public problem, how policy alternatives are formulated and negotiated, and how objectives are translated into implementation structure. This helps explain why **similar objectives produce different implementation** trajectories and spatial outcomes under different institutional conditions.

WATER UTILITIES, MUNICIPALITIES AND GOVERNANCE CONFIGURATIONS

Urban drainage spans sewerage, stormwater management, climate adaptation, spatial planning and public-space maintenance. **Responsibilities are distributed** among utilities, municipalities and actors at different levels. No organisation controls all the authority, knowledge, finance and spatial assets required for formulation and implementation. **Governance configurations** are dynamic arrangements of actors, authority, responsibilities, resources, rules, policy instruments and relations. They evolve during the policy process as actors mobilise technical knowledge, legal mandates, finance and organisational capacities.

THE HYDROSOCIAL CYCLE AND THE URBAN WATERSCAPES

The hydrosocial cycle conceptualises **water and society as mutually constituted**. Infrastructures, technologies, institutions, economic arrangements, political decisions and social practices shape water flows, while water management contributes to the organisation of society and urban space. The urban waterscape concept applies the **hydrosocial perspective to the spatial organisation of water**. It describes the material, institutional, social and political configuration connecting water flows, infrastructure, actors, public spaces and management practices within the city. Sustainable drainage transforms this configuration by reorganising how **water circulates and where it becomes visible**. It can also reshape how public spaces are designed, used, funded, managed and maintained.

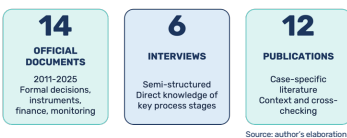


PART II. COPENHAGEN CASE STUDY

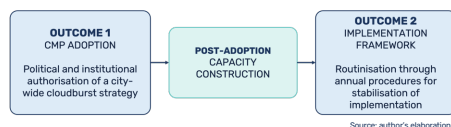
CASE CONTEXT

The 2011 cloudburst produced over 100 mm of rain in one hour. The event **increased the political visibility of pluvial-flood risk** and accelerated the development of a response. In December 2012, the city adopted the **Cloudburst Management Plan** as a city-wide strategy based on a 100-year protection ambition and a combination of surface-based, blue-green and grey infrastructure. The plan established a **strategic direction**. It did not establish all the technical, organisational, financial and procedural arrangements required for implementation.

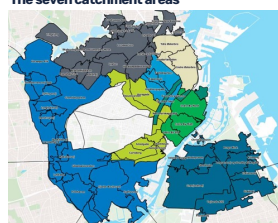
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TWO OUTCOMES OF THE POLICY PROCESS



The seven catchment areas

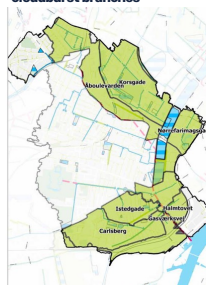


Tasinge Plads, Copenhagen
Fonte: www.klimakvarter.dk

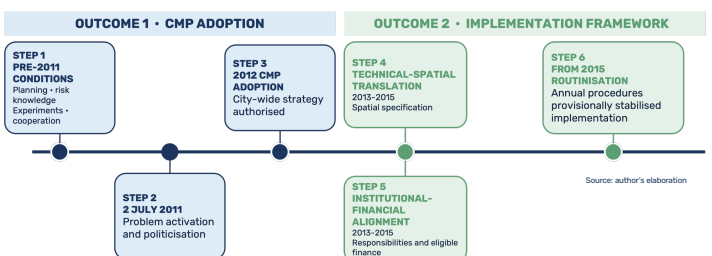


Askagade, Copenhagen
Fonte: www.klimakvarter.dk

A catchment area divided in cloudburst branches



THE CPH POLICY-PROCESS IN SIX STEPS



MAIN CASE-STUDY FINDINGS (preliminary)

- IMPLEMENTATION CAPACITY: emerged through technical-spatial translation and institutional-financial alignment.
- CITY-HOFOR INTERDEPENDENCE: the City controlled planning, public-space and municipal budgets; HOFOR contributed hydraulic knowledge, modelling, infrastructures and tariff.
- LOCAL CAPACITY IS PROVISIONAL: procedures stabilised implementation, but national regulatory changes altered the project.

A cloudburst branch and the specification of each project

