Graduation Plan

Master of Science Architecture, Urbanism & Building Sciences

Graduation Plan: All tracks

Submit your Graduation Plan to the Board of Examiners (Examencommissie-BK@tudelft.nl), Mentors and Delegate of the Board of Examiners one week before P2 at the latest.

The graduation plan consists of at least the following data/segments:

Personal information	
Name	Evangelia Telli
Student number	5812240

Studio		
Name / Theme	Theme 3/4: Social Sustainability in urban contexts: towards inclusive and just human habitats	
Main mentor	Yawei Chen	Urban Development Management
Second mentor	Audrey Esteban	Urban Development Management
Argumentation of choice of the studio	The choice of a graduation lab focusing on 'Social sustainability in urban contexts' is highly beneficial for a thesis on the challenges of urban flooding exacerbated by climate change. This choice responds to the need to explore overlooked socio-spatial dimensions of vulnerability and offers a holistic approach to urban resilience, integrating social, environmental, and infrastructural aspects. It emphasises inclusiveness and equity in policy interventions and promotes a deeper understanding of effective government-community collaboration in flood resilience planning. This thematic focus will address current research gaps by highlighting the importance of social factors in urban flood management, thereby providing valuable insights for both academic and practitioner communities.	

Graduation project	
Title of the graduation project	Building flood resilience – A case study on climate-driven flooding and vulnerable neighbourhoods
Goal	
Location:	Dordrecht, the Netherlands
The posed problem,	The increasing frequency and severity of floods in urban areas, driven by climate change, presents a multifaceted challenge that is not adequately addressed by current research and policy interventions. While much of the existing research focuses on the technical and financial aspects of flood management, it often overlooks the crucial socio-spatial dimensions of vulnerability, such as how different communities are uniquely affected by these disasters. In addition, policy interventions,

	particularly at the neighbourhood level, face significant challenges in effectively addressing the multiple factors that influence vulnerability. This is compounded by a notable gap in resilience planning, where there is limited understanding of how to develop and implement effective flood resilience strategies through government-community collaboration. These complexities highlight the need for a more holistic approach that considers the social, spatial and collaborative aspects of urban flood resilience.
research questions and	Therefore, the goal of this study is to investigate the following research question: Main RQ: How can a flood governance strategy, initiated by government actors in coordination with the community, enhance flood resilience in vulnerable neighbourhoods facing climate change induced flooding in the Netherlands? Sub-RQs: To effectively address and investigate the main research question, several sub-questions need to be answered: ○ How do the institutional actors and more specifically the local government address resilience in flood governance? [institutional approach] ○ How are flood governance strategies addressing resilience within vulnerable neighbourhoods, and what are the opportunities and challenges associated with the involvement of various stakeholders in these areas? [practice] ○ In the light of past experience, what lessons can be learned to effectively address and mitigate vulnerability in the context of flood governance? [what's next? recommendations]
design assignment in which these result.	**Research output** Goals and objectives In addition to the general objective of investigating the effectiveness of flood resilience governance in vulnerable neighbourhoods, this research will be guided by several specific aims and objectives. First, this study aims to evaluate the implementation of flood mitigation policies, both governmental and non-governmental, in these communities. It seeks to identify any discrepancies between policy formulation and practical implementation of these strategies. Second, the

	research will analyse the perspectives of various stakeholders, focusing on vulnerable community members. This approach aims to provide a holistic understanding of flood resilience governance by shedding light on how different actors perceive and engage with these strategies. Third, the study seeks to identify and highlight best practices in flood resilience governance, focusing specifically on those that have yielded positive results. By identifying these successful approaches and delving into the factors that have contributed to their success, the research can provide valuable insights for improving flood resilience in similar contexts. Expected outcome This research's expected outcomes include governance recommendations to improve flood resilience in vulnerable communities, insights into the effectiveness of Dutch flood governance. Opportunities and challenges related to the involvement of the community in the planning/ preparation phase of flood governance, and eventually some related recommendations that can be applied in different contexts. This research project aspires to produce several important results. First, it aims to provide actionable policy recommendations based on empirical findings. These recommendations will be formulated to address the unique needs and challenges of vulnerable communities. In addition, the study is poised to provide valuable insights and lessons learned from the case study in the Netherlands. These insights can be applied to other urban areas worldwide that face flood risks due to climate change, potentially shaping their flood-planning strategies and policies. Finally, the research also has the potential to advance methodologies for evaluating the effectiveness of preparation strategies, which can be an important contribution to the field of urban planning and disaster management. Limitations While this research project holds potential, it is important to recognize the potential limitations that may affect its scope and generalizability. First, the geographical focus on the Netherlands, although chosen for its natural vulnerability to flooding and its expertise in flood risk management, may limit the direct application of the findings to other regions with different characteristics. In addition, constraints related to data availability and stakeholder access may pose challenges, necessitating transparency regarding any data limitations. The time constraints of the research should be taken into account, especially when it is based on historical data, and the specific time frame of the findings should be explicitly defined. In addition, the research may be limited in terms of its generalizability to other cities with different social, economic, and environmental contexts. Variations in stakeholder perspectives, influenced by subjectivity and bias, should be

	considered as a potential limitation. Finally, the direct impact of the research on policy changes or implementation of recommendations may be limited by factors beyond the scope of the research. Ethical considerations should be carefully considered, particularly when vulnerable communities are involved, ensuring that their rights and privacy are safeguarded throughout the research process.

Process

Method description

The study will use a qualitative approach, combining theoretical and empirical research, using qualitative data collection, analysis techniques (Blaikie and Priest, 2019). Such approach would allow the collection of a wide range of data from different sources, which would provide a more complete and nuanced understanding of the research problem. The qualitative data would provide a deeper understanding of the experiences and perspectives of key stakeholders, as for instance governmental actors, and vulnerable communities themselves. More specifically, it's a single case study research. Secondary sources, such as government reports and statistics, will be used to provide a broad overview of the flooding problem and the characteristics of vulnerable communities. Moreover, the qualitative data will be collected through primary sources, such as in-depth interviews with key stakeholders, as for instance, government officials, relevant organizations, active in the case study area, community leaders, and residents. This will allow for a more in-depth understanding of the experiences and perspectives of vulnerable communities with respect to the existing flooding resilience strategies.

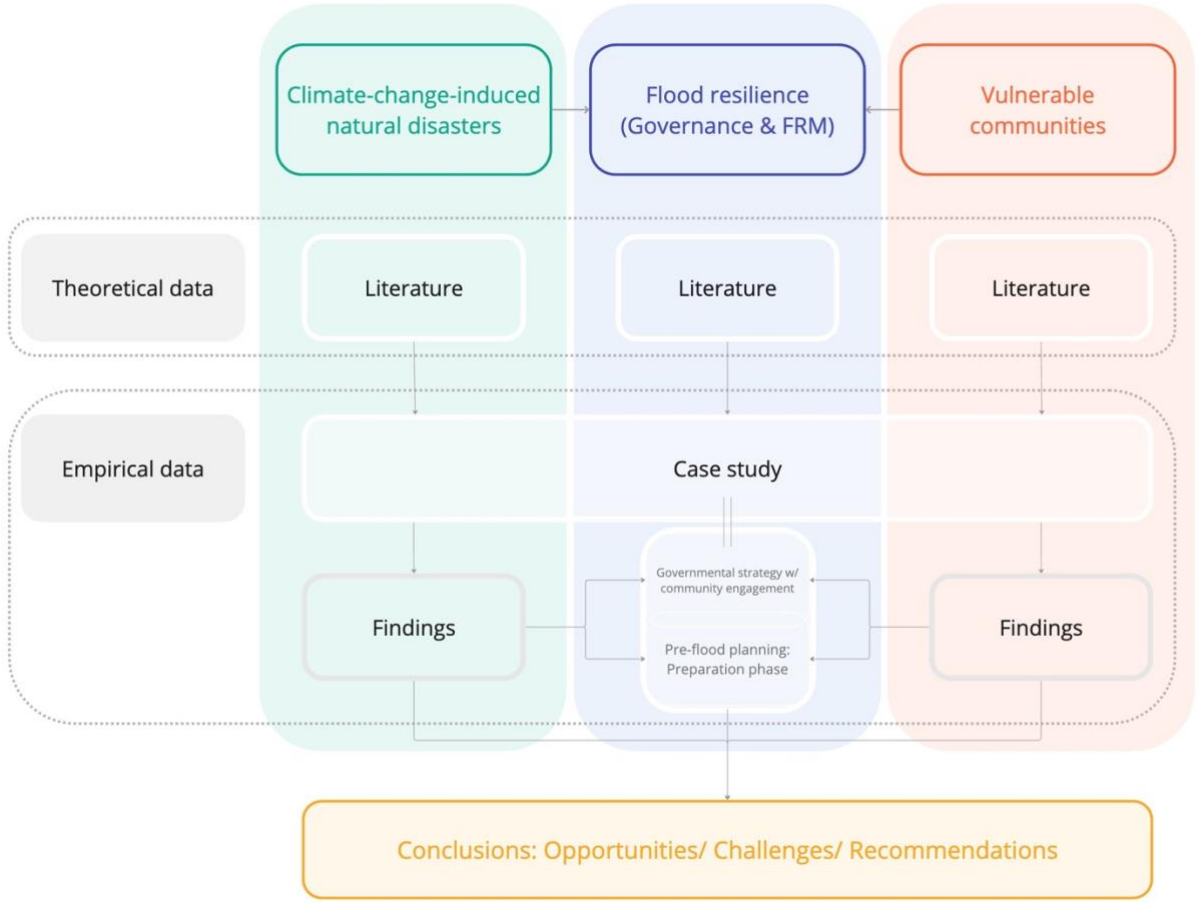

Figure 1: Research methods framework (own work, 2023)

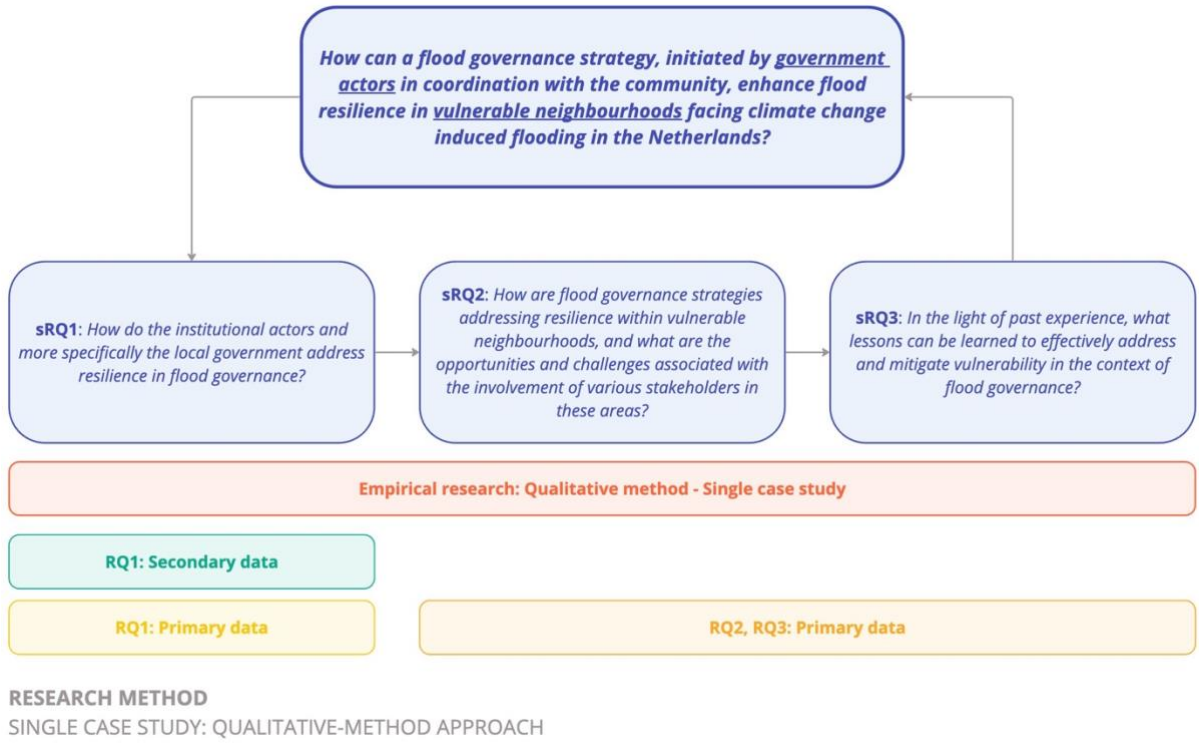

Figure 2: Qualitative method approach (own work, 2023)

Using a qualitative research approach, the study focuses on a single case study located in Dordrecht, the Netherlands. This deliberate choice is supported by the critical need for an in-depth examination of flood resilience governance strategies specific to this Dutch region. The selection of Dordrecht provides a rich perspective, facilitating a nuanced understanding of the socio-spatial factors and vulnerability challenges that influence flood resilience strategies in the region.

Case study: De Staart, Dordrecht

Table 1: Case study analysis: De Staart area in Dordrecht (own work, 2023)

Aspect	Description
Location	Dordrecht, a city located between the sea and major rivers, vulnerable to flooding. De Staart, a higher-situated district, identified as a potential safe haven (evacuation cite) and site for sustainable urban development.
Project team	VenhoevenCS collaborated with IABR–Atelier Dordrecht, led by West8, and involved experts from the City of Dordrecht and an external safety advisor.
Objective	To use water safety as a lever for sustainable urban development, focusing on De Staart as both a safe haven and a site for a new micro-mobility route serving as an evacuation route and daily urban connection.
Approach	Integration of flood resilience strategies with socio-spatial considerations. Designing for both exception (flood evacuation) and rule (daily urban life).

Key challenges	Flooding vulnerability, socio-economic vulnerabilities, the need for a mass shelter, and the isolation of De Staart as a district.
Project (sustainable urban development)	Proposed a multifunctional and sustainable building called "Higher Grounds" in De Staart, designed as a self-sufficient microcity. Integration of housing, workspaces, public spaces, and green features.
Community involvement	Emphasis on community solidarity and responsibility. Modular construction allows for flexibility in business and residential areas.
Emergency response	Higher Grounds designed to accommodate up to 5,000 evacuees in times of emergency, equipped with necessary facilities for temporary additional occupancy.
Integration with water safety	De Staart identified as a safe haven in case of a flood, with the potential to contribute to the Dordrecht water safety agenda. Water-safe facilities, housing, and a tidal park suggested for sustainable development.
Micro-mobility route	Explored the creation of a new micro-mobility route connecting De Staart and the city center, serving as both a daily urban connection and an evacuation route.
Integration of sustainable development goals	Research aimed to integrate Sustainable Development Goals (SDGs) as tools to address social, spatial, and mobility problems in addition to water safety.
Overall impact	Potential contributions to Dordrecht's growth agenda, flood resilience and sustainability ambitions, increased water safety, improved urban connections, and enhanced quality of life for residents.

Within this single case study, the research methodology aims to provide a comprehensive examination of the governmental initiatives of flood governance during the first phase, the phase of preparation. This examination aims to unravel the complexities inherent in flood governance. Specifically, the study focuses on De Staart, a vulnerable neighbourhood that is intricately embedded in the flood governance strategy of the city of Dordrecht. By acting as an evacuation site for unprotected neighbourhoods within the city, De Staart becomes a focal point for gaining in-depth knowledge about the effectiveness of real-world flood governance strategies. In particular, the research emphasises the strategy preparation phase, focusing on actions taken prior to the flood event.

The key aspects that form an integral part of this municipal project relate to the objectives of the municipality, with a particular focus on the desire to inform and raise awareness within Dordrecht, particularly within the De Staart community, about the evacuation plan. In addition, the municipality aims to plan the plan together with the De Staart community, ensuring their active participation and support. This in-depth study is important in order to identify both the opportunities and the challenges of flood management strategies, especially with regard to the

creation of safe shelters in this context. The specificity inherent in this case study serves as a catalyst for the creation of tailored and actionable recommendations. These recommendations will strengthen the governance of flood resilience in Dordrecht and potentially provide insights that can inform strategies in similar vulnerable urban areas.

Data collection

The research methodology used in this thesis project is structured to provide a comprehensive and nuanced investigation of flood resilience governance in the Netherlands. This involves a combination of theoretical and empirical insights to effectively address the research questions. Data collection methods include both secondary and primary data sources.

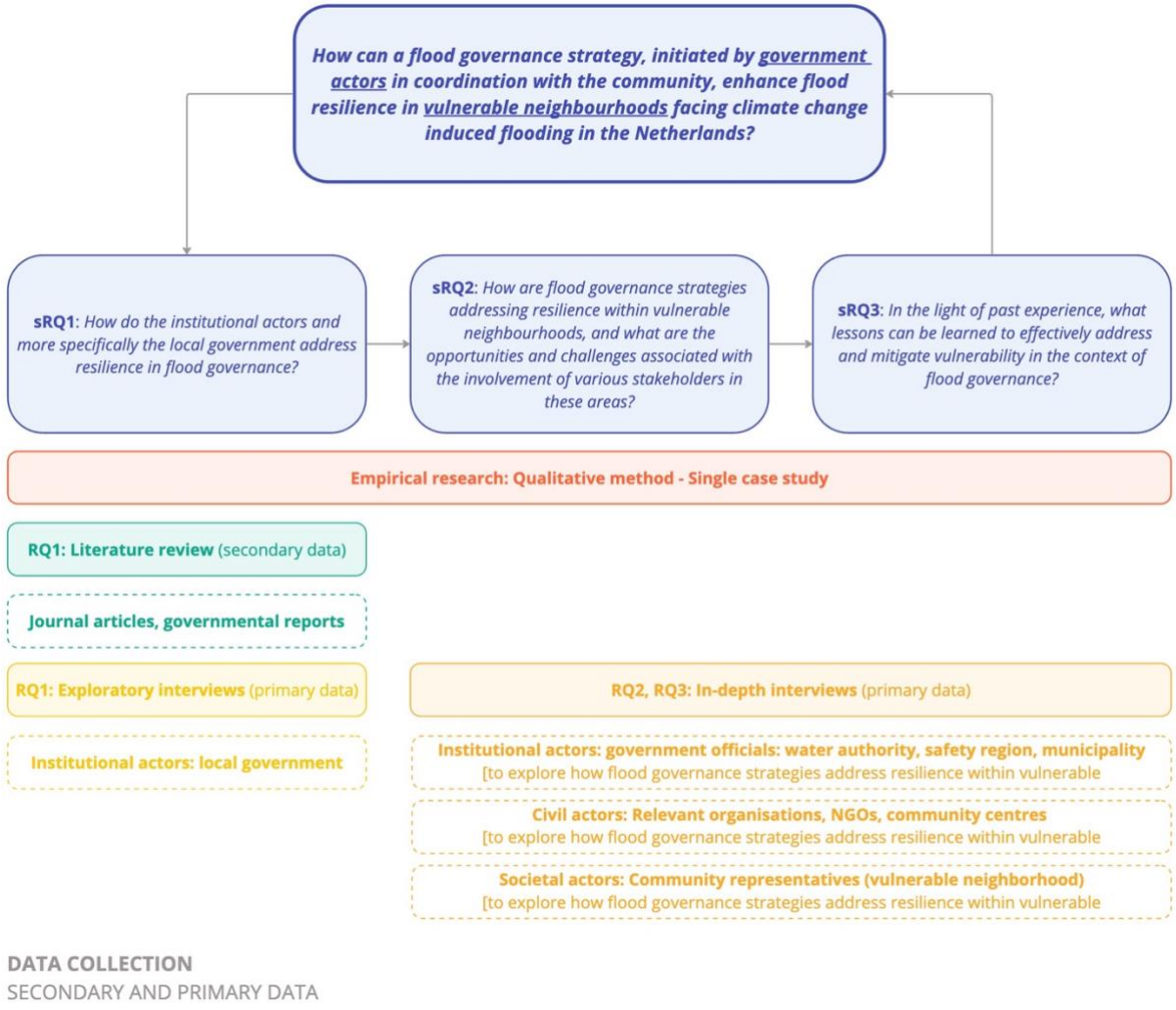

Figure 3: Methods used for data collection per RQ (own work, 2023)

Secondary data

Secondary data sources, such as government reports and flood governance strategies, are an integral part of this research methodology. These sources provide a comprehensive overview of flood challenges, characteristics of vulnerable communities and their perceptions of vulnerability. The use of secondary data serves to establish a basic framework for the case study and provides a broad understanding of the context. In addressing research question 1

(RQ1), secondary data derived from literature reviews and exploratory interviews with institutional stakeholders contribute to initial insights into flood resilience governance.

Primary data

Primary data collection uses two main methods to address research questions 2 (RQ2) and 3 (RQ3):

Exploratory interviews

Exploratory interviews play a central role in initiating primary data collection, specifically targeting institutional actors, especially those within local government units such as municipalities. These interviews aim to gather preliminary insights, establish rapport and identify key issues and priorities within the institutional framework of flood resilience governance. Conducted with government officials at different levels, these interviews will guide the formulation of subsequent in-depth interviews and ensure alignment with the perspectives and priorities of key stakeholders.

In-depth interviews

In-depth interviews represent a focused approach to primary data collection, addressing RQ2 and RQ3 exclusively. Targeting a wide range of stakeholders, including government officials, civil society organisations, community leaders and residents directly affected by the floods, these interviews delve into a rich tapestry of experiences and perspectives. Conducted in a one-to-one format, they allow for an in-depth exploration of individual experiences, decision-making processes and perceptions related to flood management. The qualitative data collected through the in-depth interviews contribute to a nuanced understanding of the dynamics of flood resilience and inform recommendations for flood risk management (FRM) strategies and policies.

Sampling

Sampling strategies include purposive sampling for authorities, based on expertise in flood resilience governance and representation from vulnerable communities. Snowball sampling is used for community perspective, where participants suggest additional field contacts for potential interviews. This ensures a wide range of perspectives and access to key informants.

Data analysis

Thematic analysis is used for data analysis, which involves identifying recurring themes and patterns in the qualitative data. This systematic approach allows for the exploration of key issues related to flood resilience governance.

Deontological considerations: Validity and reliability of data

Ethical considerations include triangulation, which involves comparing findings from different sources and methods to enhance reliability and validity. Informed consent is obtained from participants prior to data collection, respecting their autonomy and rights. Confidentiality is ensured by protecting the identities and sensitive information of participants. The information shall include providing participants with a summary of the study findings and their contribution, ensuring transparency.

Timeline and milestones for data collection

The research is structured in several phases, starting with an ongoing literature review. Subsequent phases include in-depth interviews with key stakeholders, focus groups within vulnerable communities, and data analysis and synthesis, completing the empirical research phase.

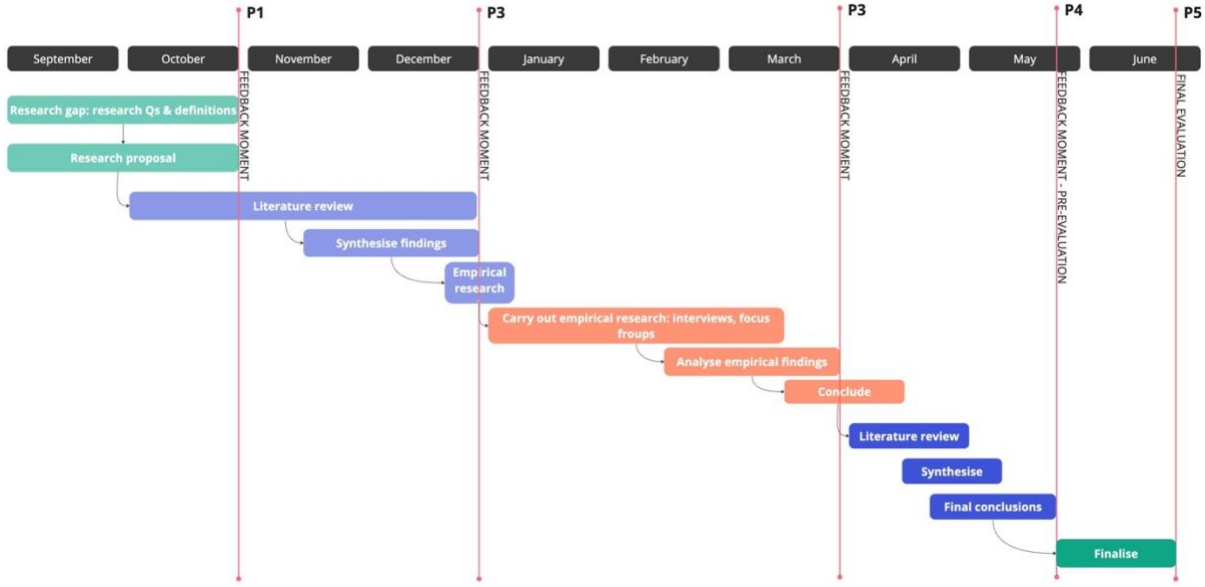

Figure 4: Time schedule and milestones of research process: from P1 to P5 (own work, 2023)

Literature and general practical references

Theoretical frameworks used in the literature review

Climate change and urban flooding: The review begins by linking climate change to the increasing frequency and intensity of urban flooding, particularly in coastal and densely populated areas. It highlights the profound impact of climate change on natural hazards, including urban flooding, and how global warming and changing weather patterns exacerbate flood risks.

Urban resilience and vulnerability: This section focuses on urban resilience as a critical framework for preparing cities to respond to and recover from natural hazards. The concept of urban resilience has evolved to encompass the resilience and adaptability of urban systems, integrating strategies to mitigate damage and enhance the ability of urban areas to maintain essential functions and rapidly adapt to disruptions. The relationship between urban vulnerability and resilience is explored, highlighting how vulnerability represents potential weaknesses, while resilience represents proactive and reactive forces in a city.

Vulnerable communities in flood-prone areas: The study looks at the dynamic nature of vulnerability in flood-prone areas, taking into account socio-economic factors. It focuses on understanding how human, environmental, and socio-economic factors contribute to flood vulnerability, particularly in vulnerable communities. This includes the importance of comprehensive flood management strategies for effective risk management and resilience building.

Community flood resilience: The research outlines a strategic framework for community flood resilience, moving from a passive disaster response to an active development approach. It redefines disasters as part of urban development and focuses on reducing vulnerability in the face of climate change. The framework includes proactive phases such as plan/prepare, absorb, recover, and adapt.

Resilience governance in flood management: A resilience strategy for flood management combines spatial planning with dynamic governance and management. This includes infrastructure development, such as dykes and floodwalls, and environmental techniques, such as wetland restoration. Governance strategies support these spatial measures through regulatory policies and institutional measures. The need for a context-sensitive, multi-faceted approach to flood resilience, including adaptive governance, is highlighted.

Variables and assessment indicators: Factors contributing to urban resilience: Factors contributing to urban resilience are identified in physical, social, economic, environmental, and institutional and governance categories.

Urban Vulnerability Factors: Urban vulnerability is defined by its potential for damage when exposed to various perturbations or stressors. It includes physical aspects such as the built environment, social vulnerability focusing on the resilience of individuals and communities, economic vulnerability, environmental vulnerability, and institutional vulnerability including the effectiveness of governance and disaster risk reduction strategies.

Socio-economic vulnerability: This concept is multifaceted and approached through different scientific lenses. Factors contributing to socio-economic vulnerability include coping capacity, demographic characteristics, health, land tenure, neighbourhood characteristics, risk perception and socio-economic status.

Conclusion
Your research takes a comprehensive approach to understanding the complex relationship between urban resilience, vulnerability, and flood management. It identifies key factors and variables that contribute to the resilience and vulnerability of urban environments, with a particular focus on socio-economic aspects and the need for adaptive governance strategies. The aim is to enhance the capacity of cities and communities to effectively manage flood risks in the context of climate change.

Reflection

1. What is the relation between your graduation (project) topic, the studio topic (if applicable), your master track (A,U,BT,LA,MBE), and your master programme (MSc AUBS)?

   This research project examines flood resilience governance strategies in the context of escalating urban flooding due to climate change. The study focuses on evacuation strategies during the preparedness phase, focusing on vulnerable Dutch neighbourhoods. It aims to fill gaps in the understanding of socio-spatial aspects of flood governance and includes a case study of Dordrecht, the Netherlands. The research is relevant for policy makers, urban planners and communities and aims to provide practical insights and recommendations to strengthen flood resilience governance. The topic of flood resilience governance strategies in urban areas, with a focus on vulnerable communities and evacuation strategies, is closely related to your Master's track in Management in the Built Environment. This track emphasises the management, planning, and policy aspects of urban environments, making your dissertation highly relevant. It addresses the complex challenge of urban flooding - a critical issue in the management of the built environment - by exploring the socio-spatial aspects and governance strategies that are crucial for effective urban planning and resilience in the face of climate change. This integration highlights the importance of governance and management strategies in the built environment, particularly in addressing climate-related challenges.

2. What is the relevance of your graduation work in the larger social, professional and scientific framework.

   The thesis project explores flood resilience in vulnerable neighbourhoods, addressing three key areas: societal, professional, and scientific. Societally, it responds to the urgent need for communities to adapt to climate-induced flooding, focusing on developing comprehensive evacuation strategies. Professionally, the research provides actionable insights for policymakers and urban planners, guiding them in formulating effective resilience policies and plans. Scientifically, the project enriches disaster management literature, particularly in flood governance, by examining community engagement and evacuation processes, thus contributing to a deeper academic understanding of urban flood resilience.