

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:

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|-----------------------------|------------------------|
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| Studio | |
|---------------------------------------|--|
| Name / Theme | Complex Cities Studio |
| Teachers / tutors | First Mentor: Marcin Dabrowski Second Mentor: Taneha Kuzniecowa Bacchin Third Mentor: Diego Sepulveda Carmona, D.A. |
| Argumentation of choice of the studio | <p>Hailing from India, I have experienced firsthand, that the lack of systematic urban planning can amplify the existing impacts of climate change events such as flooding. Also, developing countries have been focused on, in recent years as they are often the most at risk, but least capable of coping with climate change. Notable researchers like Adger (2003) have stressed on the fact that urban planning through the lens of climate adaptation needs to be addressed in order to build resilience.</p> <p>Driven by this personal experience and a fascination for urban processes in developing countries, the Global South presented an exciting area of research with governance, policy recommendations and spatial design strategies playing a crucial role in realizing regional visions.</p> <p>Set in this context, the studio of Complex Cities and the sub-group of 'Inclusive cities in the Global South' was a natural choice for this project based in Chennai, India. The research group empowers my approach, providing a strong planning foundation and the necessary tools to conduct the research.</p> |

| Graduation project | |
|---------------------------------|--|
| Title of the graduation project | Keeping your feet dry – Rethinking urban planning and flood resilience in Chennai Metropolitan Area, India. |
| Goal | |
| Location: | Chennai, India |
| The posed problem, | <p>Urbanization patterns in Chennai Metropolitan Area have developed without reflecting on the natural hydrological system by building over floodplains, marshes, lakes, and ponds (Manohar & KT, 2016). Over 90% of open swamps have been taken over by developments, reducing the total number of water bodies from 600 in the 1980s to a mere 27 in 2017 according to the National Institute of Disaster Management (Arabindoo, 2016). Instead, planning processes have responded to trends such infrastructure-led growth, market-led development, and capitalistic urbanization. (Ellis, 2012). Further, encroachment of low lying areas and the floodplains of rivers by the socio-economically weaker groups have not only exasperated the flood risk but have also trigged uneven vulnerability of the weaker section of the society.</p> <p>The result is an exclusive metropolitan area with increased flood risk and minimum participation of the urban poor and the middle class. However, the region is still urbanizing rapidly and is set to expand multi-fold, without taking into consideration, flood resilience as part of its urban agenda (Arabindoo, 2016).</p> <p>On one hand, floods are inevitable and increasing in frequency and intensity due to the deltaic nature of the region and impacts of climate change. On the other hand, this risk is aggravated due to the lack of urban planning that integrates flood resilience. Hence, there is a need to revise the regional plans and visions that are currently in place. By responding to the existing trends and recognizing the local potentials and values, flood resilience towards flooding will be integrated through strategic planning across various spatial and temporal scales.</p> |

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| <p>research questions and</p> | <p>Main Research Question:</p> <p>How can strategic planning be used as an instrument to reinforce local adaptation capacity towards flood resilience in Chennai Metropolitan Area, while responding to the existing trends and also promoting just and sustainable growth in the region?</p> <p>Sub Research Questions:</p> <ol style="list-style-type: none"> 1. What are the drivers of spatial development at the regional scale? What are the characteristics of the urban form? 2. What are the existing approaches to sustainable development in the region? How can they be integrated into the plan? 3. What are the spatial manifestations of social, economic and environmental capital that can contribute to local adaptation strategies across various scales? 4. How can social capital be used to activate interactions between environmental and economic capital for local adaptation to floods? 5. How can these strategies be designed to accommodate socio-economically vulnerable groups to ensure social and climate justice? 6. Who are the actors that can be involved in this process? What is the role of governance and how can institutions play a role in maximising participation? 7. How can these elements be made tangible into a strategic plan for the CMA? |
| <p>design assignment in which these result.</p> | |

The aim of this project is to design an integrated flood resilience strategy for the Chennai Metropolitan Area. This is done by designing a strategic spatial framework with a focus on local adaptation strategies aimed at community resilience and development.

The design product is that of a spatial vision and strategic framework consisting of spatial strategies on the Macro (Region), Meso (Watershed) and Micro (Neighbourhood) scales, each with short term and long term actions and goals. Albrechts (2004) is used to approach strategic planning in this project.

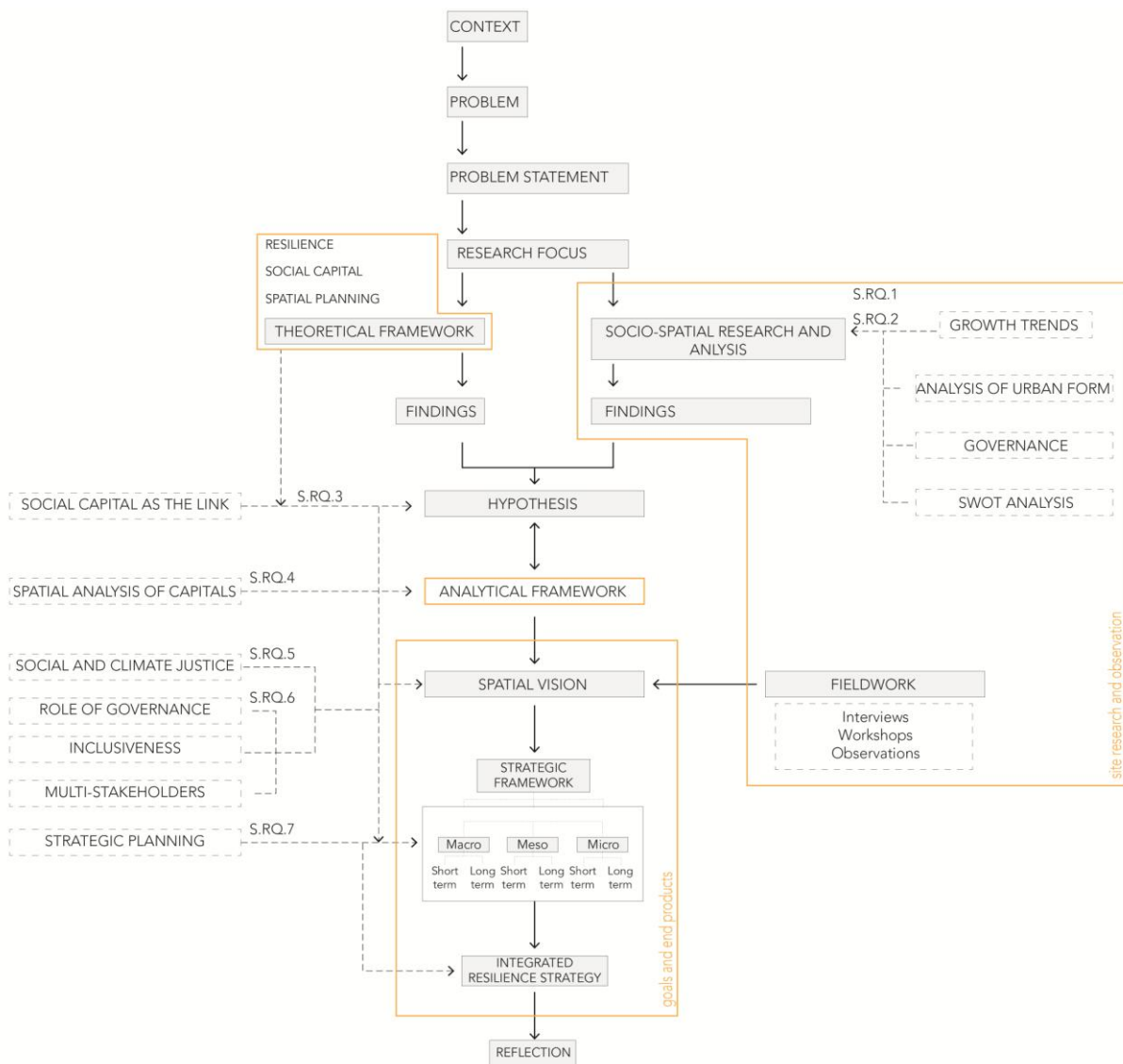
These strategies are designed by first recognizing the different social, economic and environmental capital and using social capital to link the others. Based on findings of the socio-spatial analysis of the region, the strategies are further integrated to regional demands and potentials. Collective action (Adger, 2003) is used as a concept to integrate diverse set of actors and relevant policy recommendations will be designed to support the strategies.

The local adaptation strategies are made operational by developing a detail design framework on the Meso and Micro scale and the Pallikaranai watershed is chosen as the focus area to exhibit these strategies.

Process

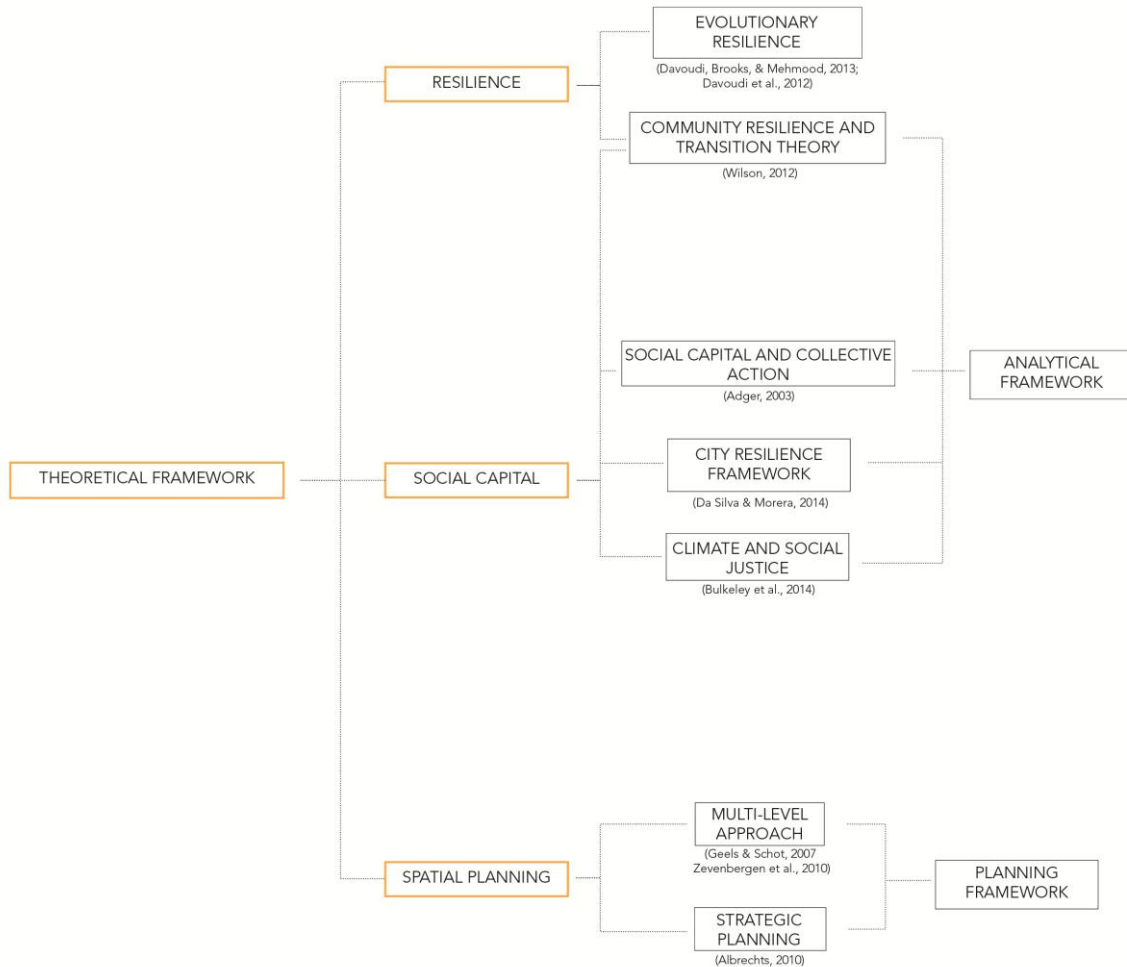
Method description

The research for this project has been carried out through the theoretical framework, socio-spatial analysis and analytical framework and the on-site fieldwork.



i. THEORETICAL FRAMEWORK:

The theoretical framework consists of three main areas – Resilience, social capital and Spatial planning. These three categories form the basis of understanding the potentials of integrating resilience and strategic urban planning. Theories on Resilience and Social capital are used to formulate the hypothesis of the project and shape the project approach. Further they are used to define the analytical framework to be followed for spatial analysis in order to design strategies for flood resilience. Finally, the spatial planning concepts used, shape the planning approach and provide a framework to be used for strategic envisioning and planning.

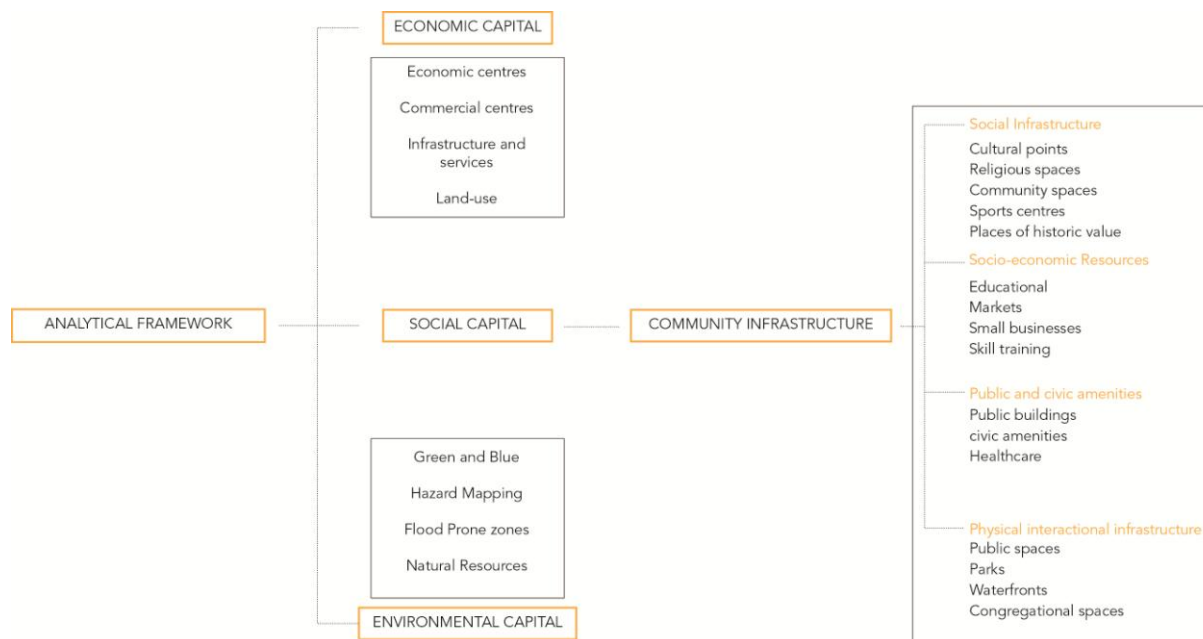


ii. Socio-spatial Analysis and Analytical framework:

Socio-spatial analysis has been carried out in order to analyse the problem at hand and to understand the current trends in the region. First, analysis of the region to understand the growth dynamics and the different layers making up the region is conducted. This is consolidated into a SWOT analysis which gives an overview of the potentials and threats in the region. Second, based on the analytical framework derived from the theoretical study, social, environmental and economic capitals are mapped.

The initial research consisted of the mapping and socio-spatial analysis of the growth trends, urban form, growth model and the governance model. Further based on the findings of the site research and the hypothesis, the different social, environmental and economic capitals are mapped and analysed. The capitals are mapped based on the analytical framework derived from the theoretical study (Da Silva & Morera, 2014; Kilpatrick & Abbott-Chapman, 2007). GIS has been used as a tool for mapping. Based on the capital assessment, the potentials for interventions are identified and a focus

area is hence defined.



This analysis is done on 3 spatial scales – Macro (region), Meso (watershed) and Micro (neighbourhood). Since the design for flood resilience deals with the hydrological system, the watershed has been considered as the meso scale. By analyzing the capitals on all scales, potentials and demands are recognized and local adaptation strategies are designed. These are further integrated into a strategic plan and design framework consisting of spatial strategies and policy recommendations.

iii. Fieldwork:

A fieldwork has been planned between the period of 27th January 2018 and 11th February 2018. During this time, observational studies, interviews, questionnaires and surveys will be conducted in order to strengthen the empirical study and the knowledge will be used to shape the project approach and design strategies. Various governmental, non-governmental and local stakeholders such as the planning authority, NGOs, Community Based organizations (CBOs), architects and urban planners in practice and the local citizens have been chosen for interviews.

Literature and general practical preference

The design and planning approach was largely shaped by the theory of Evolutionary Resilience (Davoudi et al., 2012), Community Resilience and Transition Theory (Robinson & Carson, 2016; Wilson, 2012), Social Capital and collective action (Adger, 2003) and climate justice (Bulkeley, Edwards, & Fuller, 2014). For developing the spatial analysis framework, the City Resilience Framework developed by the Rockefeller Foundation (Da Silva & Morera, 2014) has been used. As part of developing a method for spatial planning, the Four track approach (Albrechts, 2010)

and Multi-level theory (Zevenbergen et al., 2010) were used as the knowledge base.

While a large amount of literature has been reviewed and used for the project, below are a list of literature have been important theoretical and practical references:

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Reflection

Societal Relevance:

With growing risks and frequency of disasters, the local community in the city of Chennai is becoming vulnerable to the changes in climate pattern. The floods which devastated the region in 2015 claimed over 400 lives and paralyzed the city for nearly two weeks. The extreme event also resulted in an economic loss of \$3 Billion Dollars making it the world's 8th most expensive disaster in 2015. With infrastructure failing and lack of access to resources the city undoubtedly faced one of the worst disasters in history. While the existing flood mitigation responses have been inadequate in responding to the risk, this calls for the need to rethink how we plan our cities and ways to integrate the concepts of adaptation and resilience as part of the planning process. In such extreme cases, mitigation often only delivers short term solutions and hence adaptation plays an important role in not only responding to risk but also promoting sustainable urban growth.

This discussion is also set in a time of increased awareness amongst the local citizens and practitioners, and hence it is highly relevant to address the need to rethink urban planning through the lens of flood resilience in the Chennai Metropolitan Area. Also,

in the context of a developing country such as India, climate adaptation is the need of the hour, considering that the country features amongst the most at risk, but least capable of responding to it.

Scientific Relevance:

Climate change and its impacts are increasingly being studied especially in the Global south where basic infrastructural needs are not met, let alone climate adaptation. In this case, the works of Hallegatte and Corfee-Morlot (2011) suggests the relevance of the 'no regret' approach which seeks to respond to basic infrastructural needs through climate adaptation. In fact, notable researchers such as Adger (2003) have stressed on the need to consider climate adaptation as a basic approach to urban planning and processes. However, this area of research is extremely broad and has multiple contributions of varying nature. In the case of resilience, multiple definitions tend to make it more conceptual than operational hence resulting in a gap between theory and practice (Tyler & Moench, 2012). Recent works by the Rockefeller Foundation has made several attempts to make these vast concepts tangible. This paves the way for new ways to integrate resilience as a tangible concept in urban planning processes. Hence this project which looks at flood resilience as an approach attempts to bridge this gap between ongoing urban processes and adaptation to changes in climate patterns. Through this exploration, the project contributes to the ongoing discussion about adaptation and resilience in the Indian context and works on the gap between theory and practice.

Time planning

