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	**Surabhi Khandelwal**
Student number	
Telephone number	+
Private e-mail address	

Studio		
Name / Theme	Planning Complex Cities	
Main mentor	Dominic Stead	Spatial Planning & Strategies
Second mentor	Ulf Hackauf	Environmental Modelling
Argumentation of choice of the studio	This studio helped in understanding the regional construct in terms of economy, society and ecology. It would further help to develop a spatial design & planning framework for the area under study based on the distribution of resources, and potentialities of the constituencies in the region with an understanding of the metropolisation processes and rapid urbanisation in the given context. For my project, I saw my starting point as the new paradigm of megaregion which demands a shift in urbanization pattern to enable a systemic change. It involved rethinking of the centralities and the shift of centralities needed to create a new megaregional structure. Also, this studio is appropriate as it includes different approaches like -linking institutional and spatial analysis, comparative planning research, and design-led approaches to understanding spatial implications.	

Graduation project	
Title of the graduation project	Rescaled Geographies- Towards a Resilient Region
Goal	
Location:	Mumbai Metropolitan Region (MMR)
The posed problem,	Mumbai is the commercial capital of the country. The economy and morphology of the city has been shaped by the physical infrastructure but has neglected the ecological and social aspects in planning. This has led to the extreme vulnerability of the region to ecological and social negative externalities. The region experiences urban flooding every year disrupting the daily lives and inflicting loss to both the life and livelihood of many.

	Also, the state of emergency due to climate change that the planet deals with fighting sustenance for humankind is a severe challenge. Especially Mumbai, one of the largest cities in the world, is at risk of being wiped out. It is built from an archipelago of islands, the city's historic downtown core- the island city is particularly vulnerable along with most of the suburban districts. This leads to an urgent need for providing resilience to the socio-ecological system in the region by providing climate adaptive capacity against floods.
research questions and	To what extent could an alternate regional design and planning framework in the Mumbai metropolitan region through ecological infrastructure provide a resilient region against flooding? Sub- Research Questions: 1) What are the ecological infrastructures present in Mumbai Metropolitan Region? 2) What are the current ecological and social vulnerabilities in the MMR? 3) What are the strategies needed to respond to different types of flooding? 4) What are the interactions between ecological structure and society currently and how can that be strengthened? 5) What are the other physical infrastructures (man-made) to provide capacity against flooding? 6) What is the current planning system for planning against climate change and flooding? 7) What would be the critical strategies at a regional scale to provide adaptive capacity to the region?
design assignment in which these result.	The project would involve developing strategies for climate adaptation against flooding at a regional scale based on coastal, pluvial and fluvial flooding. It would involve 3 or more zoom-in locations based on the strategies developed at a larger scale and would involve detailing the ecological infrastructural development and the built/ physical infrastructure to supplement the adaptive capacity for the type of location which would depend on the built density and the strategy implementation. It would also involve designing a planning framework for action, collaboration needed between the regional planning authority and the environmental body along with the municipalities involved with a given strategy.

Process

Method description

The project would primarily involve seven methods that would be used in the course of the research. These methods and approaches are incorporated at different stages of the research as discussed below:

a. Trans-scalar mapping - This method would develop an understanding of the ecological structure of the region and also its implications on a micro-scale. It would help to gain a spatial understanding of the impacts of lack of ecological infrastructure planning on the mitigating ecological and social vulnerabilities through trans-scalar mapping across multiple scales- macro-region scale, micro-region scale, administrative boundary scale.

b. Literature review - This method would help to develop a theoretical and contextual understanding of [mega] regions, ecological infrastructure and resilience in order to clarify the research aim, to develop a conceptual and theoretical framework, and to identify the critical gaps in the contextualisation and extension of the concept of [mega]region. It would also provide insights on formulating the concept of resilience & adaptive capacity and formulate an evaluation framework to test the hypothesis.

c. Document review - This method is undertaken to collect quantitative data and to gain a contextual understanding of Mumbai. It would help to understand the governance system by understanding the structure of the government and the policies formulated and implemented. Contribute to analyse the regional development plans of the Mumbai metropolitan region for future growth & development and ecology, also for flood risk planning. It would also involve examining the CRZ regulations, ENVIS document and other institutional documents to understand policies, projects and methods of implementation.

d. Stakeholder analysis - This method would help to understand the power, interest and support of different actors influenced by this project in order to formulate planning strategies in the proposal.

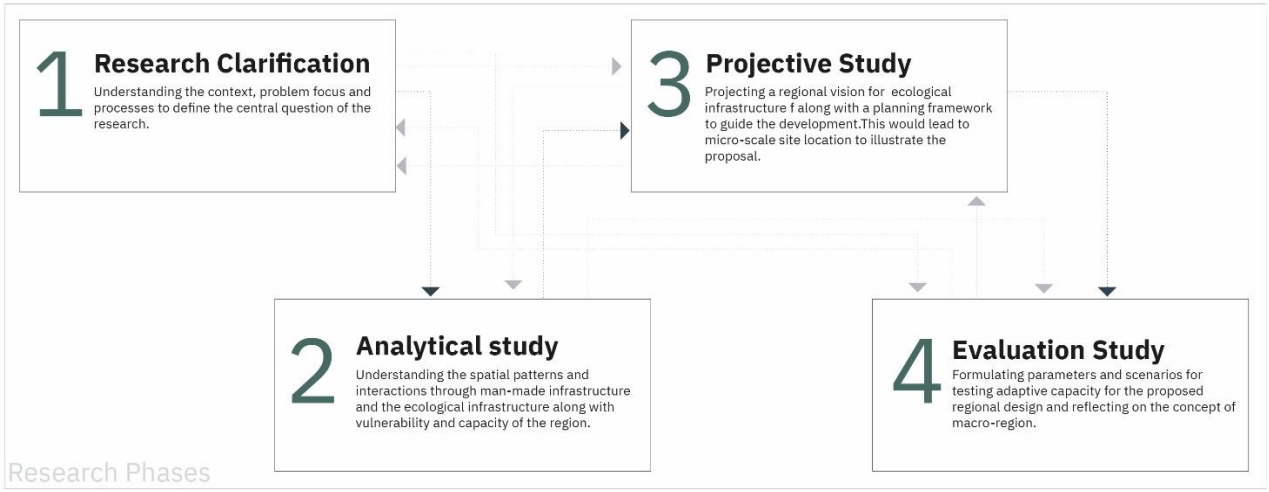
e. Fieldwork – This method would involve conducting an empirical study on the context of the study, i.e., Mumbai Metropolitan region. It would help to gain first-hand information about the ecological infrastructure like mangroves and the Mithi river to see the on-ground reality of the plans, as well as engage with the stakeholders with power and interest to the project to analyse their stance on current and future development.

f. Statistical analysis - This method helps to quantify the data necessary in the project which would involve- flows of interactions in the ecosystem, development patterns, population growth, flood risk calculation.

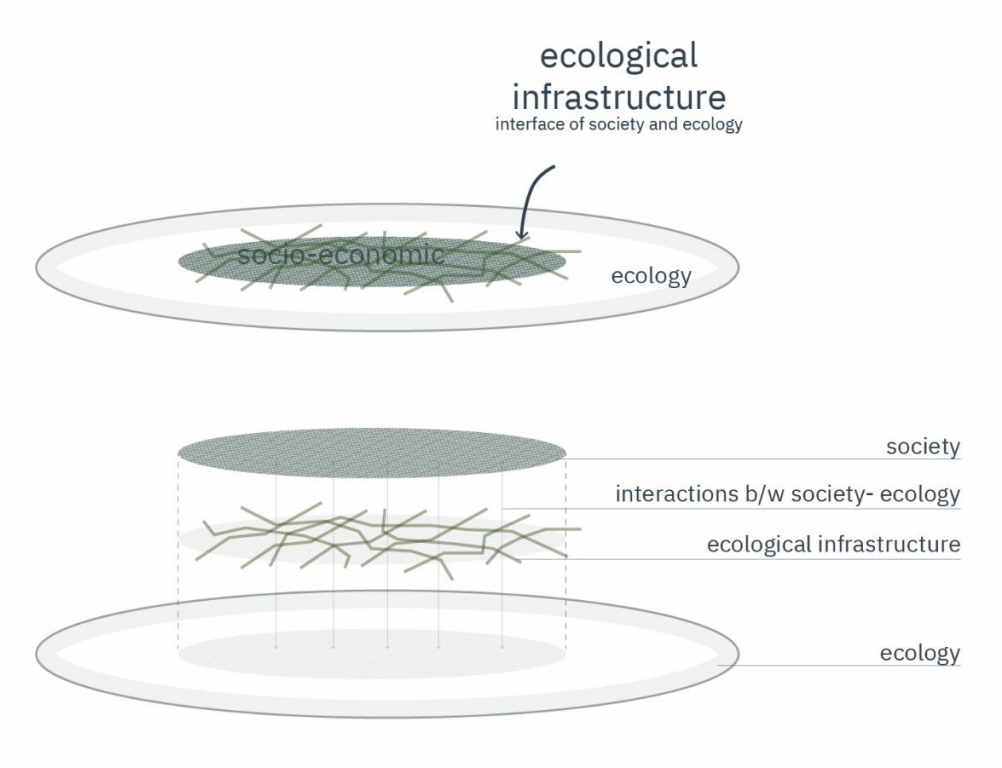
g. Extrapolation - existing trends - This method would help to project the future if the existing pattern of development continues. It helps to further the argumentation for the research proposal.

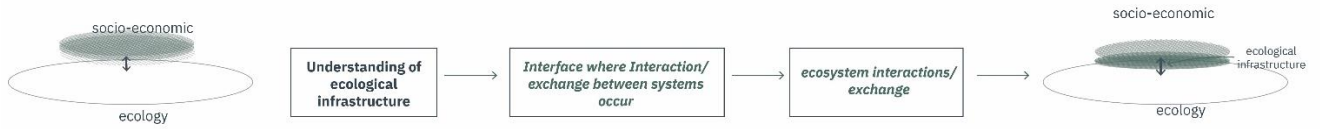
The process of the research project has been divided into 4 phases called - Research clarification, Analytical study, Projective study and Evaluation study. The figure shows the comprehended structure adapted for the research project with the contents and methods involved in the process. In general, this applied research commences with a deductive approach, coming from the broad concept of macro-region to investigate the hypothesis to the specific case of Mumbai region but at the end of the research anticipates to shift to an inductive research by its contribution of a redefined/ comprehensive understanding of the concept of macro-region in a broader perspective. Also, the research would

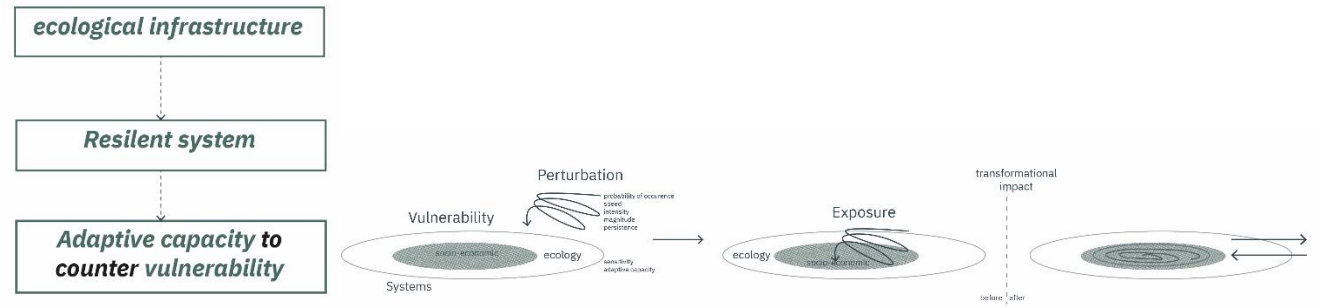
involve a constant iteration/ recursion of the research framework at definite reflection points in order to attain a comprehensive project.



Literature and general practical preference







Based on the research question, the key concepts for the project are ‘Ecological Infrastructure’ and ‘Resilience ‘. The critical theories that would help in developing the project further to clarify these concepts would be: Landscape as infrastructure , Ecosystem interactions - ecosystem services. For ‘Resilience’ it would entail understanding the ancillary concepts of Adaptive capacity ,Vulnerability, and Uncertainty.

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 program (MSc AUBS)?
   `

The project deals with regional planning which corresponds to the studio 'Planning Complex Cities' as it deals with the regional scale for spatial analysis. It would entail proposing urban ecological infrastructure design and planning framework and thereafter illustrating the design at micro-scale which is also the effort of the TU Delft Urbanism program to combine Urban Planning and Design together for designing the future built environment.

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

The graduation project would contribute to the research needed for providing resilience for our future urbanization to deal with uncertain climatic events and contribute to sustenance. The project would try to fill in a small amount of research gap in developing solutions for Climate Resilience in the Mumbai Metropolitan Region using ecological infrastructure and how the processes in the biophysical system could be used to create a socio-ecological system. The project would contribute to the scientific knowledge of regional planning in India and contribute to an approach of systemic resilience in regions in the discourse. The projections of the future illustrate that most of the city of Mumbai would be wiped out by 2050, which makes it an urgent social issue along with the short term impact and contribution to the regular flooding that occurs every year damaging the houses, livelihoods and threat to life for a large part of the society since 55% of Mumbai's population are slum dwellers who are the most vulnerable section of the society in events of natural disaster. Thus, the project also tries to deal with the question of spatial justice and provide solutions for just development.