

# 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](mailto: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	Joëlle Steendam	
Student number	4660315	

Studio		
Name / Theme	Global Housing (Architecture and Dwelling)	
Main mentor	Rohan Varma	Architecture
Second mentor	Marina Tabassum Rocio Conesa	Architecture Architecture
Research mentor	Frederique van Andel	Architecture
Delegate	Inge Bobbink	
Argumentation of choice of the studio	<p>My interest in creating meaningful design has been the main reason to study architecture. I think the Global Housing studio connects well to this vision, by being one of the studios that is not necessarily about designing the most fancy or expensive buildings, but on utilizing simple, smart and innovative ideas to add value to people's lives make a meaningful impact through design. This project is also in line with my past experiences, such as designing an expandable shipping container for refugee education in Jordan and a housing project for re-emigrants in Surinam, projects aimed at social benefit over financial gain.</p> <p>The field trip to Bangladesh was a unique experience to learn from how people live in the Global South. The trip allowed me to engage directly with local residents, understand their needs and incorporate their insights into housing solutions that fits their current way of living, rather than imposing a design model upon them.</p>	

Graduation project	
Title of the graduation project	Community resilience of riverine communities
Goal	
Location:	Keane Bridge, Sylhet, Bangladesh

The posed problem,	<p><b><i>Overall national problem</i></b>  Climate change is amplifying the frequency and severity of floods, overwhelming the current strategies of rural riverine communities in withstanding these floods, leading to loss of houses, loss of livelihood, displacement and migration (particularly to urban areas).</p> <p><b><i>Keane Bridge community (local problem)</i></b>  A close-knit Hindu and Muslim community, living in an informal settlement next to Keane Bridge, experiences flooding annually. Every year, the water reaches inside their houses, to the extent that they have to live on the streets with their family until the water recedes again. This happens about three times a year.</p>
research questions and	<p><b><i>Main research question</i></b>  ‘How can the resilience of riverine communities in Bangladesh be adapted and scaled to address the increasing severity of flooding in urban contexts, while preserving their community cohesion and livelihoods, and improving their ability to withstand future floods?’</p> <p><b><i>Sub-questions</i></b></p> <ol style="list-style-type: none"> <li>1. What can be learned from the current flood-resilience strategies of riverine communities in Sylhet during monsoon floods regarding economic stability, social cohesion, and housing?</li> <li>2. Why do the current resilience strategies of riverine communities in Sylhet fail during more severe floods, and how do these events impact economic stability, social cohesion, and housing?</li> <li>3. What can be learned from other flood-resilient solutions, beyond those of riverine communities in rural Sylhet, that can be integrated into their existing practices to enhance their ability to withstand severe floods?</li> </ol>
design assignment in which these result.	<p>A flood resilient housing design for the Keane Bridge community, that builds upon existing working community structures and promotes <u>living with the floods</u> (a ‘soft approach’ in dealing with floods).</p>

### ***Problem statement***

Bangladesh, a low-lying country highly vulnerable to seasonal monsoon floods (barsha) and extreme flooding events (bonna), has a long history of riverine communities developing resilience strategies to cope with annual flooding. These communities have adapted their homes, agricultural practices, and livelihoods over generations to mitigate the effects of regular flooding. However, as climate change intensifies these floods, traditional resilience strategies are being overwhelmed, leading to displacement and migration, particularly to urban areas.

This project focuses on the community living along the river in the city centre of Sylhet, next to the Keane Bridge, where Hindu and Muslim communities reside in informal housing structures vulnerable to severe flooding. Every year, these communities face floods that reach up to chest height in their homes, forcing them to live on the streets with their children until the waters recedes. At the same time, Sylhet is experiencing an influx of migrants from rural areas, often due to flooding in their own villages, further straining the urban environment.

### ***Project position***

As this research acknowledges the position of being an outsider to the lived experiences and rooted knowledge of riverine communities, it seeks to learn from the resilience these communities have already developed in coping with flooding. Drawing from the resilience practices and community structures found in rural riverine areas, this project seeks to explore how these traditional approaches can be adapted and scaled for the urban context of Sylhet. By integrating lessons from the adaptive strategies of rural communities with the specific needs of those living along the river in the city centre, the goal is to design housing solutions that enhance the resilience of these urban communities to increasingly severe floods. This approach will respect and build upon their existing communal ties, social structures, and ways of life, while providing sustainable, flood-resistant solutions that support both long-term residents and incoming migrants.

### ***Research questions results***

To answer the research questions, this project takes a 'learning from' perspective, aimed at understanding the local practices and migration patterns.

1. Therefore, the first sub-question (*1 – learning from current practices*) will **consist of** mapping current practices through three different scales (village, community, dwelling), and will **result in** an overview of which of the current practices should be integrated into the design.
2. Sub-question (*2 – critical gaps*) will map also **consist of** mapping current practices throughout the three scales, but from the perspective of destructive floods. This will **result in** an overview of critical gaps in current practices during flooding.
3. To find solutions to these critical gaps, sub-question (*3 – solutions*) will **explore** different case-studies, not necessarily in Bangladesh only. This will **result in** an overview of solutions to the critical gaps, which can be applied in the housing design.

## Process

### Method description

The research will be structured into two parts.

#### *Part I - Learning from current practices (monsoon floods)*

Part I analyses riverine communities during normal floods, and takes a learning- from perspective to find out how the communities currently deal with flooding. It also analyses how they live, how they use their spaces and what can be learned from this.

#### *Part II - Critical gaps and solutions (severe floods)*

Part II looks at riverine communities during severe, destructive floods. It investigates why their flood-resilient strategies do not work during these floods and what the consequences are. This part will identify critical gaps, and look at solutions (case studies) from other flood-resilient solutions that have been effective in different contexts.

#### *Scales*

To structure the research, Part I and II will both be analysed through three different scales; village, community cluster, and dwelling.

### Methodology

#### *Fieldwork*

In December, a three-week field trip to Bangladesh included visits to Dhaka and Sylhet to study the culture, environment, and collaborate with the students from Shahjalal University of Science & Technology. Various sites will be explored, from which a suitable design location will be selected (Keane Bridge). Observations were documented thoroughly through photographs, sketches, and interviews. Ethical considerations are essential, as homes will be visited which are private, intimate spaces that must be approached with respect (Pink et al., 2020). Consent will be obtained from residents before photographing their environment, and if individuals appear in photos, they will be shown the images and asked for permission to use them in the research.

#### *Literature review*

Since the field trip will be limited to three weeks of observation, the literature review will supplement insights gained during the visit. It will examine flood frequency and levels, as well as how local populations successfully adapt in areas such as agriculture, economic stability, migration patterns, and construction. The review will also explore the impacts on these areas when current adaptation methods prove insufficient. Research papers, local news sources, and books will be consulted to gain a deeper understanding of existing practices.

#### *Mapping*

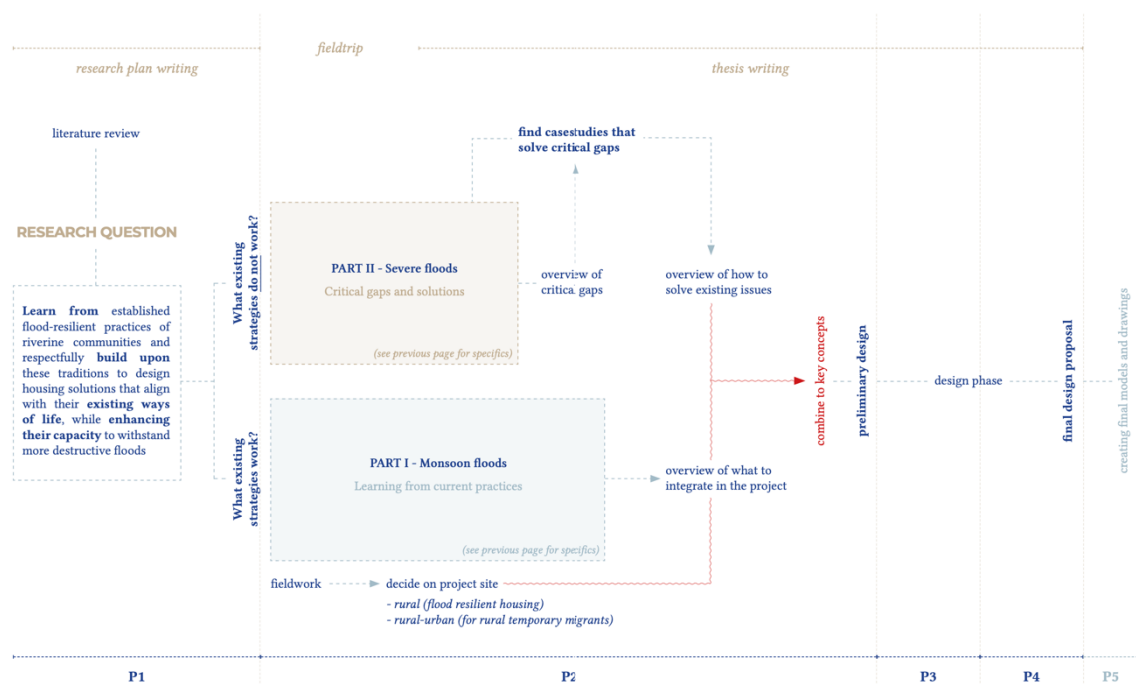
Mapping will be used to organize observations of riverine communities coping with floods during fieldwork, inspired by How the Other Half Builds (Rybczynski et al., 1984), which provides a framework for understanding and analyzing informal urban settlements in developing countries. This mapping will explore themes of everyday life across three scales: village, community cluster, and dwelling.

## Interviews

In addition to observations and documentation during fieldwork, interviews will be prepared and conducted if possible. Since the continuous flow of daily life can be difficult to capture through observation alone, interviews offer valuable context and detail (Pink et al., 2020). To explore the area through multiple scales, e Moura et al. (2023) propose a method called 'scaling stories', which investigates the social and spatial layers of an urban neighbourhood. This approach uses three scales: 1:10 (dwelling, eg., a resident), 1:100 (community cluster, eg., a local teacher) and 1:1000 (village, eg., a mayor). These scales reflect both spatial and social dimensions, as each scale represents the influence and reach of individuals within their environment. During the trip, interviews with local residents, a tour operator, a professor in the field of agriculture & water management and the Water Management Board in Sylhet.

## Case studies

Part II will include case studies both from Bangladesh and globally to illustrate how similar projects address critical gaps outlined in the problem statement and expanded upon in the analysis of Part II. Specific case studies will be selected once a site is chosen during the field visit to ensure relevance to the study.



Overview of graduation planning

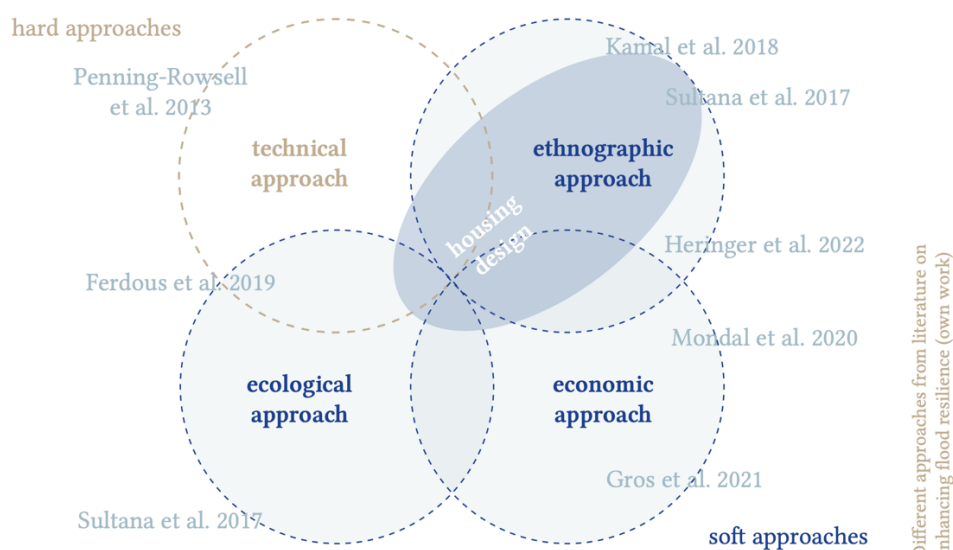
## Literature and general practical references

### *Theoretical framework*

Based on the literature review, flood management strategies can generally be categorized into 'hard' and 'soft' approaches. Hard approaches, such as technical solutions, use infrastructure like embankments and polders to control or prevent floods. While these engineered interventions aim to protect communities from immediate harm, they often disrupt ecosystems and limit local economic activities (Penning-Rowsell et al., 2013; Ferdous et al., 2019). In contrast, soft approaches prioritize **living with floods** by working with natural processes and enhancing community adaptability. These include economic, ethnographic, and ecological approaches.

The economic approach strengthens financial resilience without altering flood dynamics, focusing on strategies like livelihood diversification and forecast-based financial support. This approach mostly helps with food security, less debt and less stress (Mondal et al., 2020; Gros. et al., 2020). The ethnographic approach emphasizes adapting to floods through local practices, social networks, and migration patterns. Communities living on chars, for instance, rely on seasonal migration and flexible social networks to maintain their livelihoods amidst frequent environmental changes (Sultana et al., 2017). The ecological approach promotes sustainable coexistence with floods, using integrated floodplain management to preserve ecosystem health, which in turn supports agriculture and fisheries (Ferdous et al., 2019, Sultana et al., 2017).

This study positions itself within the **soft adaptation** frameworks. The proposed design should respect the natural flood dynamics and enhances community resilience by learning from local practices and migration patterns, without relying on disruptive structural measures.



### ***Other references***

Anuradha Mathur and Dilip da Cunha are the founders and principles of design firm Mathur/da Cunha, based in Philadelphia and Bangalore, India. In their book SOAK, they argue for water as a spectrum of wetness, where boundaries between land and water are fluid and constantly shifting. Appadurai and Carol Breckenridge who build on this idea with "wet theory", which challenges the idea of territory as a stable and permanent, but rather sees it as dynamic, shapes by constant flux and interactions between land, water and other forces (Bremner, 2018).

*"How to design with the temporality of the monsoon in mind?"*

### ***Literature***

Bremner, L. (2018). Monsoon [+ other] waters. Monsoon Assemblages

Ferdous, M. R., Wesselink, A., Brandimarte, L., Slager, K., Zwarteveen, M., & Di Baldassarre, G. (2019). The costs of living with floods in the Jamuna floodplain in Bangladesh. *Water*, 11(6), 1238.

Gros, C., Bailey, M., Schwager, S., Hassan, A., Zingg, R., Uddin, M. M., Shahjahan, M., Islam, H., Lux, S., Jaime, C., de Perez, E. C. (2019). Household-level effects of providing forecast-based cash in anticipation of extreme weather events: Quasi-experimental evidence from humanitarian interventions in the 2017 floods in Bangladesh. *International Journal of Disaster Risk Reduction*, 41, 101275.

Heringer, A., Howe, L. B., & Rauch, M. (2022). Upscaling earth: material, process, catalyst. gta Verlag.

Kamal, A. M., Shamsudduha, M., Ahmed, B., Hassan, S. K., Islam, M. S., Kelman, I., & Fordham, M. (2018). Resilience to flash floods in wetland communities of northeastern Bangladesh. *International journal of disaster risk reduction*, 31, 478-488.

Mondal, M. S. H., Murayama, T., & Nishikizawa, S. (2020). Determinants of household-level coping strategies and recoveries from riverine flood disasters: empirical evidence from the Right Bank of Teesta River, Bangladesh. *Climate*, 9(1), 4

Penning-Rowsell, E. C., Sultana, P., & Thompson, P. M. (2013). The 'last resort'? Population movement in response to climate-related hazards in Bangladesh. *Environmental science & policy*, 27, S44-S59.

Sultana, P., Thompson, P. M., & Wesselink, A. (2021). Coping and resilience in riverine Bangladesh. In *Environmental Hazards and Resilience* (pp. 111- 130). Routledge.



## 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)?

The Global Housing Studio addresses the challenges of rapid urbanization and the global housing crisis, particularly in low- and middle-income countries, by designing housing solutions that foster well-being, community, security, and justice. In line with the studio's objectives, my graduation project focuses on enhancing the flood resilience of riverine communities in Bangladesh through housing design. By building on existing resilience methods of riverine communities, including temporary migration to cities such as Sylhet, the project seeks to maintain community ties while improving safety and economic stability through secure housing and sustainable livelihood opportunities during flooding events.

This project is part of the Architecture master track, but also closely connects to Urbanism as it includes the development of a neighbourhood masterplan and public spaces, as well as Landscape Architecture, through considerations of flood management interventions in the landscape to accommodate flooding.

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

This thesis addresses a critical challenge faced by riverine communities in Bangladesh, where climate change is amplifying the frequency and severity of floods, threatening both livelihoods and traditional ways of life. Although these riverine communities have generations of experience in adapting their homes and agricultural practices to withstand regular seasonal floods, their strategies are increasingly overwhelmed by the scale and unpredictability of extreme flood events, such as the river flood in August 2017, which displaced millions and destroyed homes and farmland.

Previous flood management interventions seem valuable, such as dams, improved flood forecasting, and multi-purpose shelters, but do not connect to the specific needs of riverine communities. Dams have disrupted natural flood cycles, affecting agriculture-dependent wetlands, flood warnings are often not acted upon and multi-purpose shelters remain too scarce and distant. This research aims to bridge the gap between these existing flood management interventions and the lived circumstances of riverine communities by exploring housing solutions that build upon their own resilient practices while addressing the challenges posed by extreme floods.