

# Graduation Plan

Master of Science Architecture, Urbanism & Building Sciences


## Graduation Plan:

Personal information	
Name	Mahaa Ejaz
Student number	5939453

Studio		
Name / Theme	Metropolitan Ecologies of Place	
Main mentor	Luca Iuorio	Environmental Technology and Design
Second mentor	Anne Loes Nilleson	Urban Design
Argumentation of choice of the studio	<p>The MEP studio seems like a challenge for me since it involves breaking down the flows of all systems involved to understand socio-ecological resilience in research and design. My area of interest for thesis is looking at coastal mangroves in the Indus Delta in Pakistan, and how their deforestation is leading to more frequent climate disasters such as cyclones and floods. The reason I want to explore this topic through the MEP studio is because I want to study the system of water flows in Pakistan and how the mangrove deforestation has severely disturbed the existing water system. I also want to see how large-scale ecological disturbances influence smaller scales such as indigenous populations on remote islands of the delta. The dynamics of the Indus delta and its human and more-than-human populations is very complex, and I believe MEP can help me comprehend this is a more systemic way. The cross-disciplinary approach of this studio by combining Environmental Technology &amp; Design, Landscape Architecture and Spatial Planning and Strategy will assist me in exploring my interest from all angles and scales to have more comprehensive research exploration.</p>	

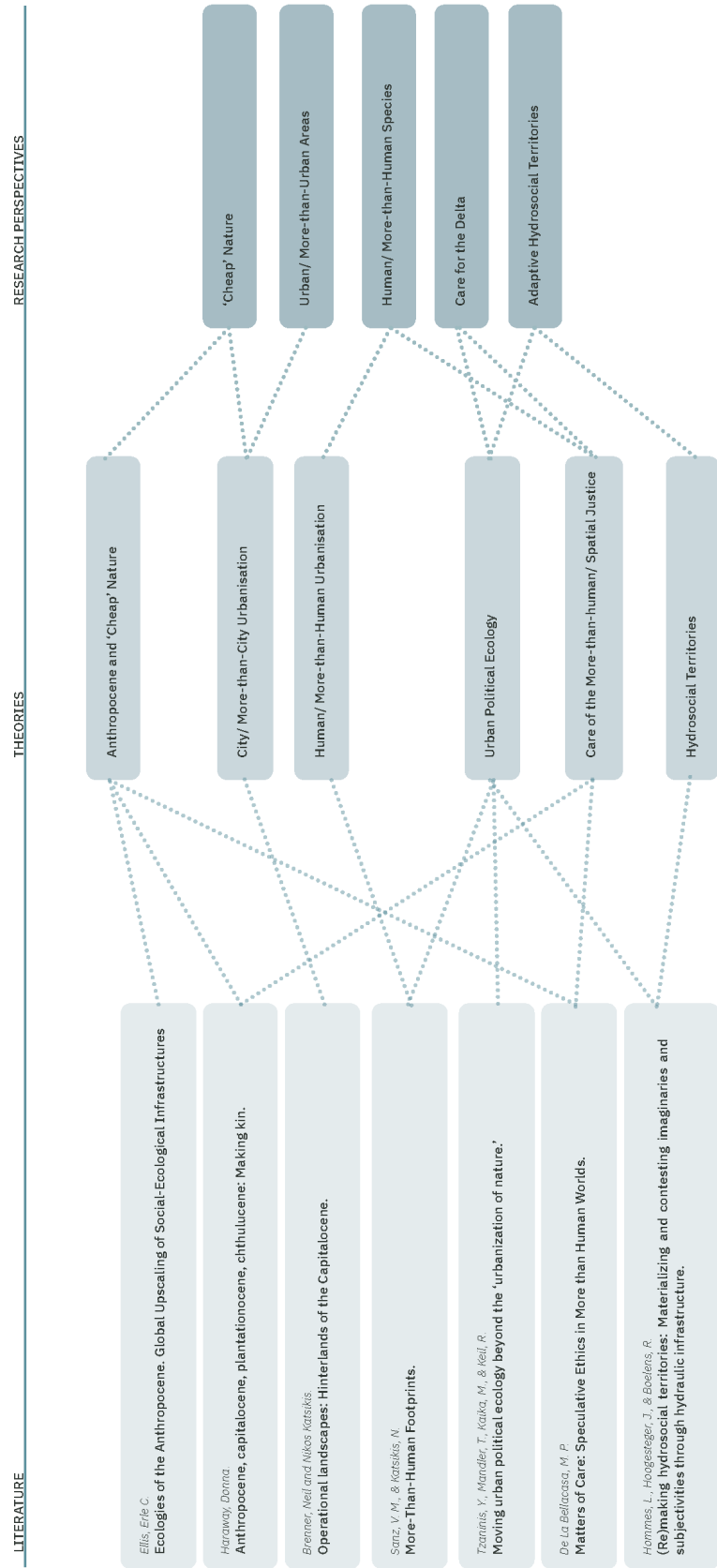
Graduation project	
Title of the graduation project	Reviving A Dying Delta: Cultivating Human and More-Than-Human Synergy in the Indus Delta through Care
Goal	
Location:	Indus Delta, Pakistan
The posed problem,	<p>Problem Statement:</p> <p>The Indus Delta, once a vibrant and resilient ecosystem, is now a "dying delta,"(Desk, 2015) facing degradation due to the interconnected impacts of environmental mismanagement, resource overextraction, and socio-political pressures. At the national level, poor water governance and extensive damming have drastically reduced freshwater</p>

	<p>flows to the delta, leading to sediment loss, seawater intrusion, and mangrove deforestation. At the regional scale, land reclamation, pollution, and agricultural expansion have further degraded deltaic ecosystems, leaving the region increasingly vulnerable to climate risks such as flooding and cyclones (The Waning Guardian of Karachi, 2024).</p> <p>The mangrove forests, vital for coastal protection, biodiversity, and livelihoods, are declining faster than restoration efforts can replace them (Hasan, n.d.). These ecosystems provide habitats for fish, shrimp, and migratory birds, sustain rural fisherfolk communities, and serve as a natural buffer against storms and sea-level rise. However, the continued loss of mangroves disrupts these functions, jeopardizing both the more-than-human populations that depend on them and the rural communities who rely on fishing and subsistence livelihoods.</p> <p>Rising sea levels, saltwater intrusion, and cyclonic activity make life on the delta increasingly unlivable, forcing many rural inhabitants to migrate in search of safety and opportunities (Ebrahim, 2020). This displacement erodes traditional ways of life and places further strain on fragile deltaic environments.</p> <p>This thesis aims to explore pathways for restoring the Indus Delta’s ecological balance while fostering resilience for its rural and more-than-human populations. By integrating ecological preservation with socio-environmental strategies, it seeks solutions to reverse the delta's decline and ensure its long-term vitality.</p>
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<p>research questions and</p>	<p>How can <b>networks of care</b> enable humans to nurture the <b>Indus Delta mangrove ecosystem</b>, fostering <b>harmony</b> between <b>human</b> and <b>more-than-human</b> populations?</p> <p>Sub-Research Questions:</p> <ol style="list-style-type: none"> <li>1. How has the Indus Delta mangrove ecosystem deteriorated due to social and economic dependencies and climate change uncertainties?</li> <li>2. How has this ecological deterioration in turn affected human populations and the delta's complex flows of water, soil and waste?</li> <li>3. How can networks of care be established using the existing dynamics of external forces within the delta such as the sea, river and urbanisation, to regenerate mangrove ecosystems?</li> <li>4. How can the mangroves of the Indus Delta become tools to create social, economic and ecological harmony to revitalise the dying delta?</li> </ol>
<p>design assignment in which these result.</p>	<p>Research Aim</p> <p>This research aims to understand and reimagine the regeneration of the Indus Delta by exploring how ecological</p>

	<p>restoration—particularly mangrove regeneration—can also become a driver for economic resilience and safer living conditions under changing climatic realities. Rather than treating ecology and economy as separate concerns, the project investigates how they can be interlinked through spatial strategies that work with the dynamic conditions of water, soil, and salinity in the delta.</p> <p>The research begins with a multi-layered analysis of the delta through fieldwork, stakeholder interviews, and mapping of environmental, social, and economic dependencies. By grounding the project in lived realities and scientific data, it identifies pressures and opportunities across multiple scales. Building on this, the design process aims to propose a more integrated and adaptive network of care—one that enables more flexible, sustainable forms of living in the delta, not only for rural communities but also in urban areas that absorb climate-induced migrants. The goal is to find ways for people and ecosystems to coexist and adapt, rather than be displaced by one another.</p> <p>Outcomes</p> <p>Using a research-by-design approach, the thesis develops and tests strategies for delta regeneration. This includes identifying critical intervention areas and designing scenario-based strategies at three scales: national, deltaic, and local. These scenarios are not fixed solutions, but iterative models that test what kinds of interventions might work—and under what conditions.</p> <p>Each strategy is assessed in relation to its ecological impact, feasibility, and implications for local stakeholders, including rural communities, urban authorities, and environmental agencies. These scenarios are used to spark dialogue between actors, test spatial ideas, and challenge assumptions about what is possible.</p> <p>The final outcome includes a spatial vision for the Indus Delta—one that weaves together preservation, production, and recreation into a coherent, care-based framework. It suggests that regeneration is not only about restoring what was lost, but about building new relationships between people, land, and water that are more just, adaptive, and long-lasting.</p>
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## Theories:



### *Anthropocene and 'Cheap' Nature*

This research began with a critique of how human actions have degraded landscapes over time in order to sustain themselves (Ellis, 2014). Anthropogenic activities in Pakistan such as agriculture and increased urban infrastructures have led to the maximization of control over natural resources such as freshwater and mangrove forests. Donna Haraway reveals how this over-extraction of natural resources cannot be limitless (Haraway, 2015). Our perception of nature as a 'cheap' resource starts to change when we start needing to replace the natural functions of nature with human interventions, such as canals to redirect water from the river when its natural flow changes. When nature is mismanaged, it also loses its capacity to give 'refuge' to human and more-than populations (Haraway, 2015). This has created unprecedented loss and migration due to homelessness in Pakistan as well.

### *Urban and More-than-Urban*

This then brings in the question of what we understand as a city and what systems support it indirectly without being included as the core part of the city. Brenner and Katsikis elaborate on the idea of 'hinterlands' or 'more-than-city' landscapes that support the city by providing the functions of 'supply zones, impact zones, sacrifice zones, logistic corridors' and others, that a city pushes to its peripheries (Brenner & Katsikis, 2020). The urban can then be understood as both the city, that is the core and the more-than-city, that still exists within the peripheries of the city.

With reference to this research, the urban in the delta region is the city of Karachi and also its sub-urban fishing villages, industrial areas and ports. The author then situates the more-than-urban in the Indus Delta, as it is physically removed from the urban but still has socio-economic ties with it, such as the fisherfolk community of the delta. The more-than-urban Indus Delta has been reduced to simply a landscape of production without any care for its more-than-human entities (Brenner & Katsikis, 2020).

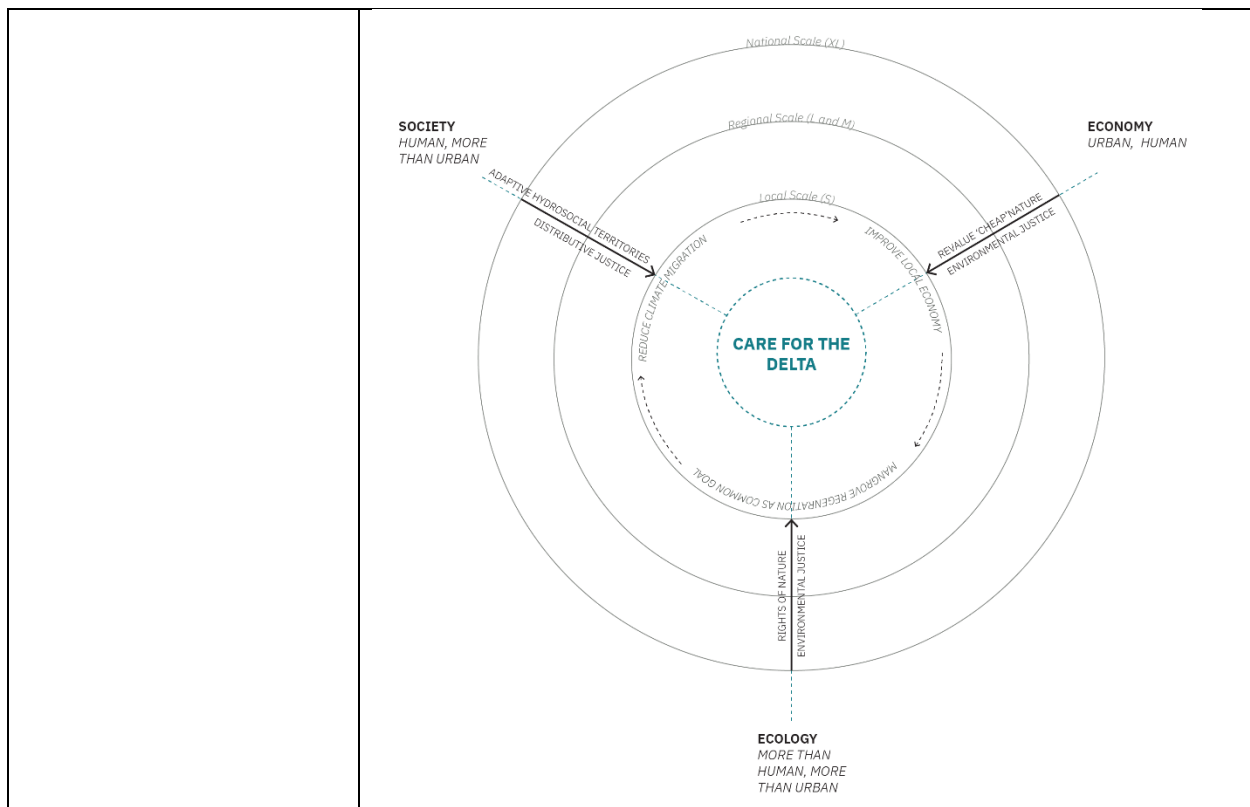
### *Human and More-than-Human*

Urban Political Ecology sheds light on how the way humans organize nature to suit our means is always political (Tzaninis et al., 2020). The reclamation of land and

	<p>consequent deforestation of mangroves in the coastal areas of Karachi, has capitalist motives as these biodiverse landscapes are replaced by industrial complexes and elite residential areas (Sanz &amp; Katsikis, 2023).</p> <p>The more-than-human inhabitants of the delta can be recognized as the mangrove ecosystems that support both terrestrial and aquatic life. These perform 'unpaid labour' (Sanz &amp; Katsikis, 2023) as they cater to local and global economy without any compensation.</p> <p><i>Care for the Delta</i></p> <p>De La Bellacasa introduces 'care' as a way to critique existing norms and how a shift in priorities is needed, that is, moving the focus away from humans to the more-than-humans (De La Bellacasa, 2017). This brings in the urgent need to care for the delta since it has lost the capacity to care for its own inhabitants (De La Bellacasa, 2017). This idea of care becomes the premise of this thesis, as indigenous knowledge of the mangrove ecosystems can help sustainably regenerate the delta, while also giving more ownership to local fisherfolk communities.</p> <p><i>Adaptive Hydro-social Territories</i></p> <p>The relationship between humans and the Indus Delta has drastically transformed with the decrease in freshwater and increased frequency of climate related vulnerabilities. If human 'subjectivities' change when infrastructure fixes relations between people and water (Hommes et al., 2022), this thesis also aims to understand how this relationship between space, water and people can be made more flexible and adaptive, to create a more transformative way of living.</p>
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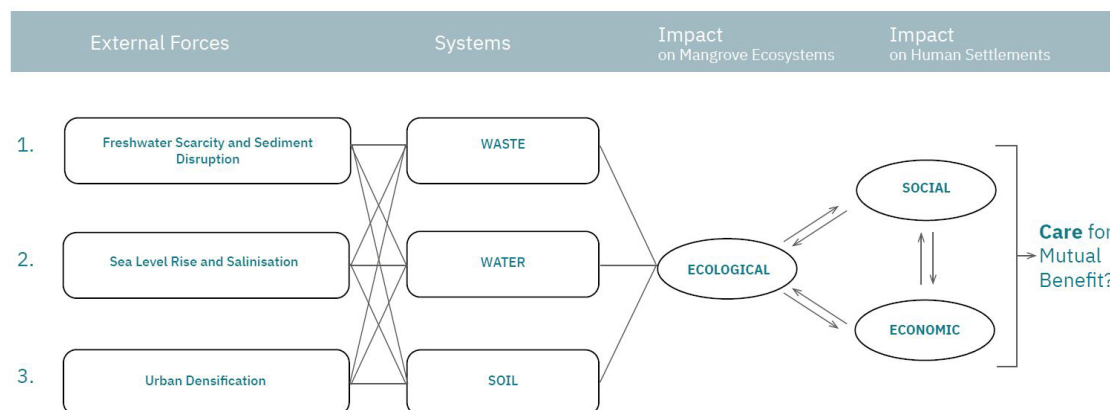
	<p>Conceptual Framework:</p> <p>The conceptual framework centres on the idea of “Care for the Delta,” addressing the complex socio-environmental challenges of Indus Delta’s ecosystem. It integrates three core dimensions—society, economy, and ecology—and aims to use mangroves as the main tools for change. This central objective is supported by interventions at local, regional, and national scales, reflecting the interconnected nature of the issues and solutions.</p> <p>The society dimension focuses on reducing climate migration and promoting adaptive hydro-social territories that ensure distributive justice. This aims to give more ownership to local fisherfolk within the process of reviving the delta including mangrove regeneration. It emphasizes inclusivity and equity in creating systems that are socially resilient and responsive to climate change.</p> <p>The economic dimension highlights the need to improve local economies while valuing natural ecosystems and their services. It aims to explore how local economy can flourish without relying solely on mangrove ecosystems. Environmental justice and mangrove regeneration are key, offering mutual benefits for both economic and ecological stability.</p> <p>Finally, the ecology dimension stresses the rights of nature and the importance of more-than-human systems in ensuring a sustainable future. It calls for informed reforestation, habitat restoration, and environmental justice to mitigate environmental risks and restore balance.</p> <p>Together, these dimensions form a synergistic framework that integrates social, economic, and ecological considerations, advocating for a sustainable future for the Indus Delta.</p>
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## Process

### Method description

Methodology:



How can networks of care, enable humans to nurture the Indus Delta mangrove ecosystem, fostering harmony between human and more-than-human populations?

	Contextualisation	Theoretical & Conceptual Framework	Analysis	Research by Design (Networks of Care)	Proposed Design Vision	Conclusion and Reflection
How has the Indus Delta mangrove ecosystem deteriorated due to social and economic dependencies and climate change uncertainties?	Literature Review Analytical Mapping	Literature Review	Literature Review Data-based Analysis Analytical Mapping Fieldwork Observations	Case Study References		
How has this ecological deterioration in turn affected human populations and the delta's complex flows of water, soil and waste?	Literature Review Analytical Mapping	Literature Review	Literature Review Analytical Mapping Fieldwork Observations Informal Interviews Microstories	Case Study References	Case Study References	
How can networks of care be established using the existing dynamics of external forces within the delta such as the sea, river and urbanisation, to regenerate mangrove ecosystems?		Literature Review	Literature Review Analytical Mapping Systemic Analysis Policy Overview	Case Study Reference Scenario Design (Networks of Care)	Vision for the Delta Local Scale Interventions Stakeholder Evaluation	Evaluation Ethical Considerations Scientific and Societal Reflection
How can the mangroves of the Indus Delta become tools to create social, economic and ecological harmony to revitalise the dying delta?		Literature Review	Literature Review Fieldwork Observations Analytical Mapping Systemic Analysis	Case Study Reference Scenario Design (Networks of Care) Phasing	Vision for the Delta Local Scale Interventions Stakeholder Evaluation Phasing	Evaluation Ethical Considerations Scientific and Societal Reflection
P1						
P2						
P3						
P4						
P5						

## **Literature and general practical references**

### Literature:

Ahmed, W., & Kidwai, S. (2024). Indus River Delta. In *Delta Sustainability: A Report to the Mega-Delta Programme of the UN Ocean Decade*. Springer.

Ali Siyal, Prof. Dr. A. (2018). *Climate Change: Assessing Impact of Seawater Intrusion on Soil, Water and Environment on Indus Delta Using GIS and Remote Sensing Tools*. US. Pakistan Center for Advanced Studies in Water (USPCAS-W).

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Brenner, N., & Katsikis, N. (2020). Operational landscapes: Hinterlands of the Capitalocene. *Architectural Design*, 90.1, 22–31.

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Sanz, V. M., & Katsikis, N. (2023). More-Than-Human Footprints. *FOOTPRINT*, 17(2), Article 2. <https://doi.org/10.59490/footprint.17.2.7401>

The Waning Guardian of Karachi. (2024). WWF. [https://wwfasia.awsassets.panda.org/downloads/mangrove-document\\_compressed\\_1.pdf](https://wwfasia.awsassets.panda.org/downloads/mangrove-document_compressed_1.pdf)

Tzaninis, Y., Mandler, T., Kaika, M., & Keil, R. (2020). Moving urban political ecology beyond the 'urbanization of nature.' *Progress in Human Geography*, 45, 030913252090335. <https://doi.org/10.1177/0309132520903350>

## Case Studies:

### 1. Khulna as a water inclusive enclave. (2019). Defacto Architecture and Urbanism.

- Understanding Mangrove Ecosystems
- Need for a policy framework to implement changes on local and national level
- Mangroves as a way to improve local economy

### 2. Pacific Reef Fisheries, Australia by ASC

- Natural filtration system ( used the abundance of naturally occurring mangroves that surround the farm to sustainably and naturally filter water, and developed macroalgae technology used to clean aquaculture wastewater)
- Self seeding

### 3. UNDP Timor-Leste Accelerator Lab

- The creation of low-cost, do-it-yourself (DIY) water filtration systems.
- These systems, assembled from locally available materials such as fine sand, coarse sand, anthracite coal, pea gravel, and gravel, have the potential to convert rainwater into clean potable water.

### 4. Mangrove Restoration In Mteza Creek, Mombasa, Kenya

- The key objective of EarthLung's Mangrove restoration project in Kenya is to uplift financially disadvantaged coastal communities by revitalising the mangrove forests aiming to 'break the cycle of poverty'.
- Through the restoration of the biodiverse estuary, this initiative will not only establish new fishing grounds but also generate supplementary sources of income.
- Economic incentive for locals to plant and take care of mangroves