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	Tara Kanj
Student number	5562155

Studio		
Name / Theme	Transitional Territories *Inland-Seaward: The trans-coastal project*	
Main mentor	Dr. ir. Taneha Kuzniecow Bacchin	Section of Urban Design Department of Urbanism
Second mentor	Dr. ir. Luisa Maria Calabrese	Section of Urban Design Department of Urbanism
Argumentation of choice of the studio	The subject matter of my Bachelor thesis titled *Intertidal negotiations* was influenced by my particular interest in informal coastal settlements combined with coastal engineering. I am particularly fascinated in the liminal territory between land and water, as it confers a sense of temporariness, indeterminacy, and imprecision; the power that water possesses in carving territories together with its geopolitical implications on vulnerable communities is an extremely captivating realm. I am also interested in the challenge of designing for uncertainty, such as the unpredictability of environmental disasters (primarily the implications of the rising sea levels) as well as geopolitical phenomena. I would then like to take the opportunity throughout this thesis project to further expand on the topic that I barely brushed the surface of during my Bachelor Thesis; informal coastal settlements hosting vulnerable communities. However, rather than tackling a single informal settlement, I intend to address one body of water affecting many different territories in various ways. With this, I envision an interdisciplinary project encompassing environmental, social, geopolitical, and spatial structures. Such a vision is perfectly aligned with the essence, focus, and approach of the Transitional Territories graduation studio.	

Graduation project	
Title of the graduation project	Beneath the pavement, the beach. *An investigation of uncertain coastal morphodynamics in the presence of geopolitical repercussions along the Lebanese coastline*
Goal	
Location:	The littoral zone of Beirut, Lebanon
The posed problem,	**Problem statement** Coastal morphodynamics is determined by [A] a permutation of environmental and anthropogenic mutations, rendering coastal landscapes as highly uncertain and

vulnerable. This is especially pertinent and amplified in the context of the Lebanese coastline, as it is defined by its [B] narrow geometry coalesced with powerful natural forces and [C] exceptionally turbulent human activity. Consequently, the uncertainty of coastal natural forces consolidated with the country's entrenched political conflict, corruption, and violence has resulted in a largely inaccessible and exponentially deteriorating coastline.

[A] Permutations & Uncertainty

A permutation is a mathematical technique that determines the number of possible arrangements of a set of variables. There exists a myriad of factors which determine and influence the morphology of a coastal landscape, conventionally distinguished into anthropogenic and natural forces. While these forces are heavily addressed and studied individually, the probability and consequences of their occurrence in conjunction with another is overlooked. The large permutation of environmental and anthropogenic occurrences results in a stochastic number of possibilities, impossible to account for simultaneously, yet crucial to dissect and understand. The coastline under investigation is subject to extreme forms of such forces, which manifest across various temporal and spatial scales. Contemporary approaches to address such conditions revolve around attempts to unreservedly control nature through static interventions that neglect both, the uncertainty diagnostic of natural forces in conjunction with anthropogenic disruptions. Furthermore, there exists a lack in planning approaches that can reconcile the varying spatial and temporal scales that are integral to systems operating across coastal landscapes, especially ones consumed with deep levels conflict.

[B] A brief summary of the predominant natural forces

The Lebanese coastline extends about 230 kilometers in length from south to north, characterized by its narrow continental shelf and geolocation between the Mount Lebanon mountain range and Mediterranean Sea (Ministry of Environment & UNDP, 2011). The coastline's particular location on the eastern edge of the Mediterranean makes it vulnerable to varying magnitudes of natural forces, hazards, and disasters, manifested in the form of heavy rainfall, drought, flooding, earthquakes, tsunamis, and landslides. The shoreline is affected by an erosion rate of 45.24%, primarily due to its exposure to massive winter storms, generated by North-Eastern high-speed currents (Faour & Hamzé, 2014). Coastline erosion is aggravated by the plethora of embankments and sand extraction, which also heavily fragment the coastline. Flooding in Lebanon is mainly caused by irregularities in its rainfall patterns instigated by the globally rising temperatures and the predominance of impermeable surfaces. In terms of its geology, Lebanon lies astride an active plate boundary, known as the Levant Fault System (where the eastern Arabian plate is sliding northward and clockwise relative to the Sinai plate located in the west) while simultaneously facing another significant plate boundary over Cyprus, known as the Cyprus Subduction Zone (Elias, 2015). Lebanon is situated in the midst of these active zones, highly influenced by the relative motion of these plates, making the occurrence of earthquakes highly probable (Hawie et al., 2013). Studies have revealed that such formations can generate the largest earthquakes (of magnitudes equal to or more than 8), consequently resulting in secondary coastal and inland hazards, such as tsunami waves and landslides. Such occurrences would completely obliterate the littoral zone and all its anthropogenic traces, as it is already subject

	to soil liquefaction due to the heavy construction on its alluvial plane (for instance, the airport) (Elias, 2015). **[C] A brief summary of corruption, violence, and conflict** Lebanon's modern history is characterized by its corrupt sectarian political and religious strife combined with its ongoing conflict with neighboring states (such as Israel, Syria, and Iran). The succession of such conflicts accumulated into a series of wars, economic collapses, and increased sectarian polarization, resulting in the current state of general chaos. A few of such numerous occurrences include the fifteen-year civil war (1975-1991), the Israel invasion (1982-1985), the assassination of the prime minister (2005), the July war with Israel (2006), the October uprising (2019), and the August 4 port explosion (2022). As a result of the accumulation of conflict in the region, the coastline is highly fragmented, inaccessible, and hosts copious forms of contraventions with deep complexities. In addition to the country's severe lack of public spaces, the littoral zone is scarcely accessible despite its legal public nature. **Problem focus – the case of Beirut** The region delineated as Greater Beirut serves as a microcosm of various forms of violations that could possibly occur on a coastline making it an optimal area of focus and a unique opportunity of a case study of extremes. The coastline is composed of fragmented shorelines, each harboring a distinct variation of infringement, yet united by the continuous mutation of the sea. The 6 instances of these violations are composed of [A] illegal privatization, [B] informal coastal slums, [C] extreme maritime pollution, [D] a post explosion port, [E] coastal dumpsites, and [F] the capital's airport.
research questions and	**Main Research Question** How can the understanding of Beirut's coastline as a [A] series of extreme environmental and anthropogenic permutations inform its [B] design agency, programming a coastal space which functions as an [B] autonomous littoral landscape while simultaneously [C] attaining spatial justice for its inhabitants? **Analysis sub questions** [A] What are methods to attain a requisite understanding of how a coastal system will evolve when its morphology is determined by a set of highly volatile permutation of variables? [A] How can methods of quantitative analysis inform decisions for qualitative measures? [A] How do you investigate a context whose data has constantly been erased throughout its history? / What methods could be implemented to analyze a site that is devoid of data? **Design sub questions** [B] How to program robustness embedded within the coastline of Beirut to react to different contingencies by learning, evolving, and accordingly, adapting? [B] What are strategies of intervention for highly uncertain futures?

	[B] What are strategies of intervention to establish an autonomous littoral landscape? [C] What methods of intervention can disrupt entrenched corruption and ameliorate the precarious lives of city dwellers? [C] How to circumnavigate political strongholds and corruption?
design assignment in which these result.	**Projected Outcomes** This process of research by design will result in the composition of: • A literature review composed of an amalgamation of philosophic and scientific writings encompassing relevant theories (elaborated on below). • An assessment composed of a cartographic, graphical, and interpretive analysis as a tool to gain a deep understanding of the context's environmental, social, and spatial conditions. • A design and framework proposal The selection of the coastline of Beirut as an area of focus was due to the diversity of infringements it harbors in a relatively small amount of coastal space. The tactical selection of the six scenarios previously mentioned would result in a unique opportunity to gain a holistic understanding of a coastal landscape which has well surpassed its limits. Consequently, this will result in a design proposal for each of the six locations, directly reacting to unique the problematics each one possesses, but following a unified set of criteria. Preliminary ideas of such criteria are listed as such: Goals on design interventions • The design proposals will include a set of key design objectives and their interventions; small-scale installations which through the evolution of time, natural processes, and perhaps their interaction with one another, will result in large-scale alterations. This will be used as a method to circumnavigate spatial limitations set by political strongholds. • The interventions will symbiotically evolve with natural processes, metamorphosing hybrid structures which simultaneously accommodate for social and environmental problematics. • The interventions will result in spatial justice through establishing access to a previously inaccessible coastline, through a set of methods which does not compromise the natural regeneration of the landscape. • The proposals will set the stage for uncertainty, leaving room for discovery. • The interventions are scalable, and the method of their implementation can be retrofitted in other locations with similar characteristics. Goals on morphology • Establish a continuous shoreline, fully coherent and accessible from edge to edge. • Generate uninterrupted visual and physical access to the coastline. • Set the stage for a shore space which accommodates to unpredictable fluctuations in its morphology in a way which does not compromise its health, ease of access, and spatial quality.

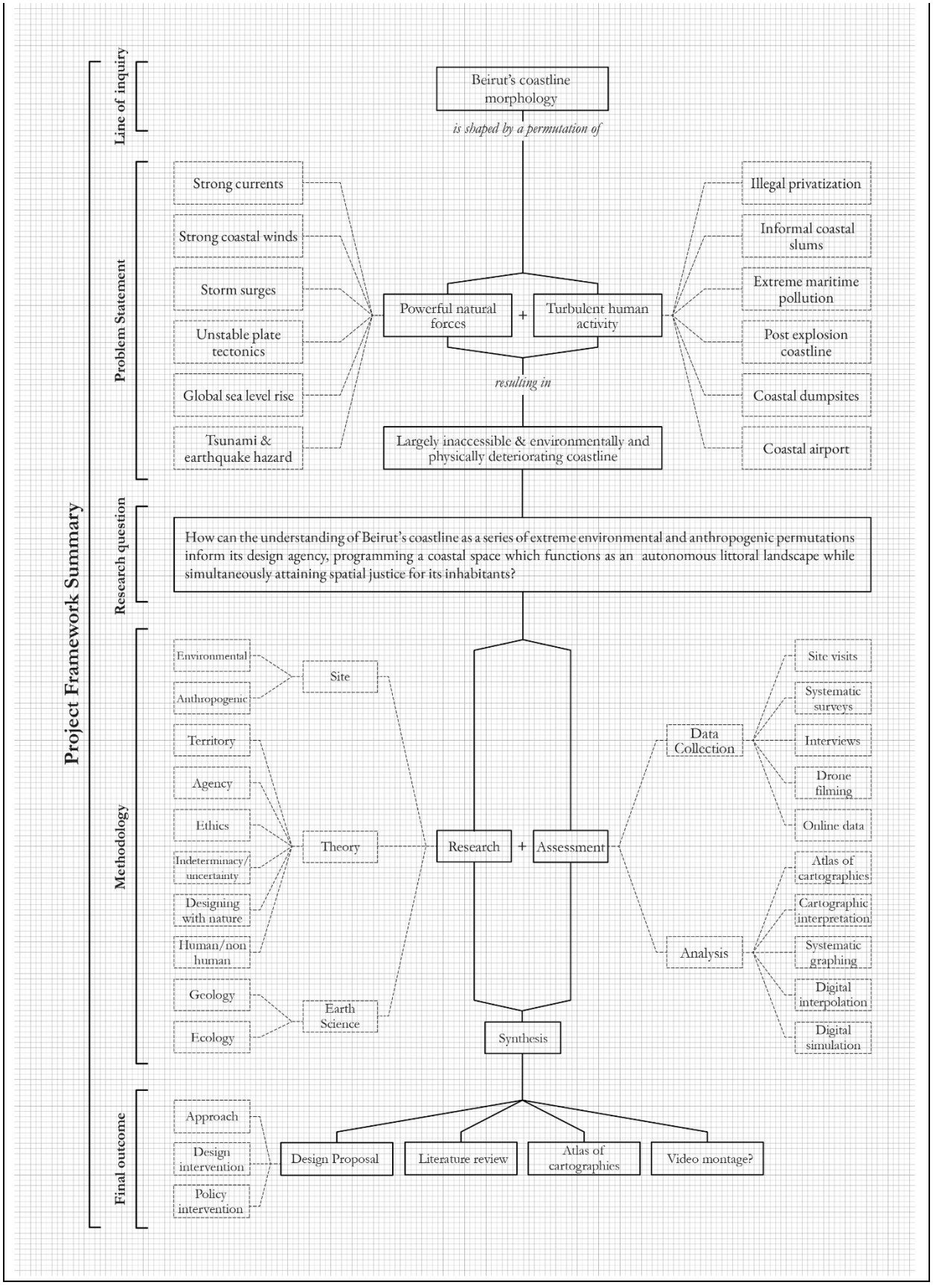
	• Reinforce, reclaim, and protect the exponentially receding coastline. • Address the shore space's constantly fluctuating morphology as a tool rather than an obstacle.

Process

Method description

As mentioned previously, Lebanon is politically unstable and is subject to an ongoing history of wars, therefore, it is characterized by a repeating cycle of erasure and formation. Battles, explosions, and chaos lead to the obliteration of states, data, and matter. This, combined with ambiguity and the clandestine nature of corrupt politics, results in a major lack of accurate data. This provokes the following inquiries: How is life in the sequence of different intervals, between what remains, what is erased, and what has transformed? How do you investigate a context whose data has constantly been erased throughout its history? I plan to do this through the following methods:

- A temporal analysis of the coastal physiography, with an ethnographic reading of how the quality of private, collective, and public life are shifting throughout these cycles and in the moments of pause in between. This will require the thorough collection of raster data, its subsequent (manual) transformation into vector data, and the superimposition of the different layers collected to draw conclusions.
- The extraction of high-resolution satellite imagery, drawing conclusions through relational spaces.
- Methodical filming using drones, attaining high resolution aerial imagery. Such imagery could reveal numerous layers of information encompassing spatial, social, and environmental patterns.
- Site visits, including the manual transcription of conditions, interviews, and systematic surveys.
- A thorough investigation of online databases.
- A literature review combining and synthesizing all relevant bodies of research.


Project Framework Summary
Line of inquiry
Beirut's coastline morphology
is shaped by a permutation of
Problem Statement
Strong currents
Strong coastal winds
Storm surges
Unstable plate tectonics
Global sea level rise
Tsunami & earthquake hazard
Powerful natural forces
+
Turbulent human activity
Illegal privatization
Informal coastal slums
Extreme maritime pollution
Post explosion coastline
Coastal dumpsites
Coastal airport
resulting in
Largely inaccessible & environmentally and physically deteriorating coastline
Research question
How can the understanding of Beirut's coastline as a series of extreme environmental and anthropogenic permutations inform its design agency, programming a coastal space which functions as an autonomous littoral landscape while simultaneously attaining spatial justice for its inhabitants?
Methodology
Environmental
Anthropogenic
Site
Territory
Agency
Ethics
Indeterminacy/ uncertainty
Designing with nature
Human/non human
Theory
Geology
Ecology
Earth Science
Research
+
Assessment
Data Collection
Site visits
Systematic surveys
Interviews
Drone filming
Online data
Analysis
Atlas of cartographies
Cartographic interpretation
Systematic graphing
Digital interpolation
Digital simulation
Synthesis
Final outcome
Approach
Design intervention
Policy intervention
Design Proposal
Literature review
Atlas of cartographies
Video montage?

Literature and general practical preference

My research comprises of three overarching categories of readings on site, theory, and earth sciences. Research on my site will include a thorough contextual review of published literature to gain the requisite understanding of Lebanon's history, politics, social conditions, natural systems, and geology. This will be accompanied by writings on theories which are applicable to both my topic of focus and the context under investigation, such as readings on "territory" and how it has been addressed throughout literature, on indeterminacy and designing for uncertainty, on the conception of time and landscapes, on the dichotomy between man and nature and designing with nature, and finally, on the ethics of designing in the presence of vulnerability towards social and environmental justice. Lastly, this project requires research on certain categories of earth science, such as geology, oceanography, and ecology, to first, gain a comprehensive understanding of how the systems I am addressing throughout my project operate, and to consequently have a scientifically informed analysis and design proposal.

Main Bibliography (so far)

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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 thesis is about the convergence of two boundlessly perplexing dimensions; turbulent coastal morphodynamics of a vanishing coastline in the presence of acute geo-political conflict and social injustice. Individually, these topics belong to the distinct fields of earth and social sciences, however their concurrence results in problematics which are addressable through the discipline of Urban Design. I plan to maximize the power that this discipline holds in integrating multidisciplinary realms through this project off extremes. The principles integral to the master track of urbanism (further accentuated in the Transitional Territories studio) are the guiding principles of my project, primarily through addressing the state of fragility and risks ingrained in a coastal landscape.

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

Professional relevance

This project proposes a specific approach to address, assess, and design for areas of extreme conflict. This proposed method suggests the requirement of a high level of interdisciplinarity and flexibility, adopting to the specificities of the context at hand as a planner. The approach adopted carefully navigates through the paradigm shifts which the discipline of urban design and planning underwent, translating them into the proposed approach through which I advocate for in this project.

Social relevance

My graduation project directly addresses quality of life and space, and the limitations of an abundance of convoluted politics, shedding light on spatial injustices and violations. In search for answers for dissecting the relationship between territory and the pivotal forces that shape it, my project will address the extent to which man is interlinked with nature through a review of the literature of Bruno Latour, Tim Ingold, Alex Wall, Charles Waldheim, Anthony Giddens, … resulting in the possession of a position on the ethical considerations required when vulnerable communities are involved in confluence with vulnerable landscapes. Who do we address first? Who (if) do we prioritize?

Scientific relevance

The scientific relevance of my graduation work includes the deep incorporation of various scientific fields with the discipline of urbanism. Throughout the assessment of my context, I conducted (and will continue conducting) a literature review on writings encompassing different scientific studies addressing the Lebanese coastline's physical condition. This resulted in the collection of multidisciplinary literature, such as writings on marine geology and biodiversity, tectonic geomorphology, natural disasters, environmental pollution, hydrology, and coastal morphodynamics. There is an abundance of individual studies assessing specific phenomena occurring on the coast, my research contributes by creating a fusion of said studies and synthesizing them into unified conclusions. The design phase will additionally require a deep understanding of conscientious coastal engineering and dynamics.