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	Marina Aliki Deffner
Student number	6062105

Studio		
Name / Theme	Transitional Territories | Altered Nature: Poetics of Change	
Main mentor	Diego Andres Sepulveda Carmona	Urbanism (Section Spatial Planning and Strategy)
Second mentor	Luca Iuorio	Urbanism (Section Environmental Technology & Design)
Argumentation of choice of the studio	Transitional Territories was a studio that intrigued me from the very beginning due to its interesting themes and approach. I believe that the concept of "altered nature" and specifically "altered landscapes" really aligns with the core of my project, since one of the things I am attempting to examine is how the alterations of various conditions of the Lake Karla system in Thessaly have rendered it a critical zone regarding flooding. This has happened through a series of human manipulations with the aim of operationalizing the former Thessalian floodplains for agricultural purposes, contributing to the increase of the existing flood risk, impacting human and non-human actors. Topics like climate change, excess and scarcity of resources (specifically water) are integral to the framing of my project. My ultimate goal would be to examine the operability of those floodplains and the potentialities for their transformation in order to develop adaptive capacity to flooding, activating a process of evolutionary resilience. This studio allows me to adopt a multi-scalar and transdisciplinary socio-ecological approach, addressing the issue with sensitivity to the history and culture of the place, while simultaneously taking a critical position to existing and past processes and practices, whether those are centralized or localized, that have contributed to the system's inability to cope, recover and adapt to the rising hazard.	

Graduation project	
Title of the graduation project	Transforming (flood)plains: Activating a process of evolutionary resilience in Lake Karla
Goal	
Location:	Thessaly, Greece
The posed problem,	The agricultural plains of Thessaly, Greece, located in the Pineios River Basin, have the natural tendency to flood, as the flattest and lowest part of the region (Bathrellos et al., 2018). However, the changing climate patterns, which cause more frequent events of extreme precipitation, combined with a series of human-induced processes of manipulation, are contributing to the system's inability to cope and recover in the event of flooding (Dimitriou et al., 2024). These processes are described by the extensive urbanization of the former floodplains for agricultural purposes coupled with continuous alterations of the natural system to combat water scarcity (Evelpidou et al., 2023). Additionally, inadequate planning processes and persistent unsustainable practices regarding water management, as well as the linear, short-visioned and sectoral approaches to flood risk mitigation, further exacerbate the system's inability to recuperate, pushing it to its limits. If a solution is not found, the accumulation of strains will lead to the total exhaustion and degradation of one of the most productive agricultural cores of Greece. Therefore, a reconfiguration of the water management system is essential in order utilize the operability of the floodplains to activate long-term adaptive transformations, which in turn will foster resilience to flooding.
research questions and	**Research question** How can an ***integrated design*** of the **Lake Karla** system, with the implementation of successful **land management policies,** incorporating **land transformation strategies**, bridge the gap between **coping**, **recovery** and **adaptive capacity** to ***flooding*** in Thessaly, activating a process of ***evolutionary resilience***? **Sub-questions** ***WHAT? – ANALYSE*** How is **flood risk** defined by the relations between *hazard, vulnerability and exposure* (in the Thessalian context)? What are the **systems and sub-systems** related to hazard, vulnerability and exposure that need to be explored in order to assess Thessaly's flood risk, and what are their *interrelations*?

	WHY? – EXPOSE What are the current **environmental, physical, social and economic conditions** of Lake Karla's system, affecting hazard, exposure and vulnerability, and how have they been *altered,* resulting in a spatial transformation? What are the current **policies and plans** for flood risk mitigation and water management and what kind of *conflicts* do they create with local sensitivities? What are the current **coping and recovery capacities** of Lake Karla's resilience against flooding and how are they defined by *biophysical and socio-technical limits*? ***HOW? – PROPOSE*** What are the **critical zones,** defined by the overlay of biophysical and socio-technical limits, of the Lake Karla system and what **transformative actions,** based on an *ecosystem-based adaptation,* need to be implemented in order for the system to become ***resilient*** to flooding? How do the possible **alignments** between *centralized land management policies* and *local adaptation practices* define which land transformation strategies are implemented at a local level, and how can the existing processes and practices be reframed through a ***paradigm shift***? How can this localized **design approach** then be *upscaled* to the sub-basin and river basin level towards an integrated ***environmental management*** of the region, which fosters ***evolutionary resilience***? ***HOW SO? – POLITICIZE*** What are the possible **spatial and socio-cultural implications**, and what *trade-offs* need to be negotiated between local and global institutional systems? How does the proposed systemic transformation perform under an **Ecosystem Services Assessment**?
design assignment in which these result.	This research aims to first examine and ultimately enhance the operability of the Thessalian (flood)plains through a transformative process, for the system to be able to better cope, recover and adapt in the event of flooding, using the critical area of the Lake Karla system as a case study. The overall aim is to initiate a process of evolutionary resilience to flooding. To achieve that, an integrated design is

	proposed that takes into account the regional processes and local adaptation practices to the increasing flood risk during times of uncertainty. Therefore, it is first essential to comprehend from the existing literature what is flood risk, and how it is defined by the disciplines of hazard, vulnerability and exposure, as well as what different systems are then related to those notions and how they also interrelate with each other. This understanding, will lead the way to assess Lake Karla's current coping and recovery capacities, which are defined by biophysical and socio-technical limits, and locate areas (*critical zones*) where these limits – and subsequently capacities – have been reached or not, creating a range of transformability potential in order to activate a process of socio-ecological (or otherwise *evolutionary*) resilience (Davoudi et al., 2013) through an ecosystem-based adaptation. These adaptive transformations are then going to be tested by design explorations on the local scale and their upscaling possibilities to the sub-basin and river basin scale. Finally, an evaluation of the proposed systemic transformation will conclude this body of work based on its possible implications and its performance under an Ecosystem Services Assessment. Therefore, the expected outcomes can be summarised as follows: 1. A comprehensive understanding of risk literature and system interrelations. 2. An assessment of Lake Karla's coping and recovering capacities, and a categorization of critical areas within a range of potentiality for adaptation. 3. Design explorations testing the proposed adaptive measures on the local scale and the possibilities for upscaling. 4. Evaluation of the proposed transformation. Consequently, the design project will consist of a design strategy, specifying these needed adaptive transformations, tested by adaptive pathways which will define the preferred route, guiding site and context-specific design implementations in the local scale. Finally, this process will be then upscaled to the sub-basin and river basin level.
[This should be formulated in such a way that the graduation project can answer these questions. The definition of the problem has to be significant to a clearly defined area of research and design.]	

Process

Method description

My methodological framework, as aforementioned, is based on a "paradigm of critical planning", introduced from the lawyer and urban planner Peter Marcuse, whose work focused largely on gentrification, justice and the concept of the *right to the city*. Specifically, Marcuse argues that research should follow the sequence of "analyze, expose, propose, politicize", in order to move from the realm of theory to "radical urban practice" (Marcuse, 2009).

Analyze means taking a step back in order to examine the roots of a problem, as well as the actors that are involved and the conditions that make it materialize (Marcuse, 2010). *Expose,* which in some cases encompasses the analyzing step, means to bring to light the underlying issues that are located beneath a surface-level problematization, using critical urban theory as a tool (Marcuse, 2009). This includes disclosing the conclusions drawn from the analysis to the public and highlighting the potential consequences of the project. Multiple alternatives are also presented, with the aim of making the planning process completely transparent to the public. This step plays a crucial role in making informed decisions about planning strategies in order to move forward to the proposal. The *propose* phase consists of the development of a vision which is realistic and feasible working with the directly affected groups. Then to *politicize* these actions, means to disclose the possible conflicts that might arise during the implementation of the project and how those can be resolved by supporting the organization strategy (Marcuse, 2009).

In my project, I re-interpret this framework and organize my research questions to clusters according to the four steps, which then also align with my conceptual framework. Firstly, after recognizing flood risk as the main problem, the *analyze* phase for me consists of understanding the systems that are related to the disciplines of hazard, vulnerability and exposure and how they are interrelated with each other, in order to come to conclusions about the conditions that need to be examined. Secondly, *exposing* means disclosing the current conditions as well as the transformative processes that have contributed to their altered state. This, together with criticizing the existing plans for flood risk mitigation and the showcasing how they come in conflict with local values, result in the identification of the area's coping and recovery capacities to flooding, as defined from the biophysical and socio-technical limits of the system. Defining these capacities and limits is a crucial step in order to proceed with the *propose* step, in which a vision that is based on the maximal alignment between different stakeholder groups within different scenarios is presented. Finally, to *politicize* means to assess the possible implications that might come up during the stage of the project implementation and how to negotiate trade-offs in order to address them, as well as evaluate the performance of the proposed spatial and institutional transformations.

Main methods used:

Literature and policy review

It is important to examine the existing academic literature in order to strengthen the theoretical underpinning of my project. Therefore, special focus should be given on the definitions of risk, capacity and resilience. Additionally, research should be conducted about the terms that will assist me in the development of my proposal, such as ecosystem-based adaptation – specifically nature-based solutions – environmental co-management and ecosystem services assessment. Combined with this thorough literature review, it is imperative to study the existing policies and plans that are put into place so as to understand the current context of centralized processes and how they can challenge local dynamics.

Spatial and historical analysis

Spatial analysis through a Geographic Information System (GIS) approach is also necessary to situate these abstract concepts of vulnerability and exposure spatially. The goal is to understand the conditions and dynamics of the area, in order to later define the limitations of the system's capacities to flooding. It is essential also to comprehend the processes of alteration the system has undergone through historical analysis and how this has impacted the present state and could be detrimental to reaching those limits.

Stakeholder analysis

Stakeholder analysis will be used in order to understand the power dynamics between different actor groups and individuals in the area, as well as their varying interests, needs and potential impact. This is then necessary in order to configure alternative paths and locate possible alignments and synergies between institutional collaborations.

Site visit

Fieldwork, consisting of on-site investigation and collecting data, is essential to gain a deeper understanding of the current conditions of the area, which is impossible to happen solely through desktop research. Through informal interviews and ethnographic fieldwork, the deeper nuances and sensitivities of the system will be revealed, and visual documentation will assist in capturing the sense of the place, creating intrinsic motivations and visions for possible transformative actions that could be implemented.

Case study

Using the Lake Karla system as a case study, the scope of the project is limited to a feasible scale of implementation, where the research hypothesis is tested. The possible results then can be upscaled.

Critical cartography and layering approach

Critical cartography, which includes the process of overlaying the current conditions, is imperative in order to locate the areas where biophysical and socio-technical limits have been reached or not, therefore defining the "critical zones" within a range of potential transformability.

Scenario building
Scenarios are a strategic tool in order to design and propose specific pathways that respond to conditions of uncertainty that climate extremes and the levels of institutional integration can create. This approach can then facilitate the development of adaptive strategies according to the potential alternative futures.

Dynamic adaptive pathways
Dynamic adaptive pathways (here used as dynamic adaptive design pathways) is an approach developed by Deltares and TU Delft and is based on the concepts of Dynamic Adaptive Planning and Adaptation Tipping Points (Haasnoot,et al., 2019) in order to propose alternative paths between different strategies that can provide a framework for decision-making in a future that is uncertain. It also provides signalling points in order to identify where decisions need to be revisited and make adjustments to the proposed plans. Here this model will be used in order to reveal the preferred route according to each stakeholder group for the possible scenarios, define the possible alignments between them and then move forward to proposing site-specific design interventions accordingly.

Research by design
Research by design is integrated by making a research hypothesis that then will be tested through the phase of design implementation in the local scale and its subsequent possibilities of upscaling to the sub-basin and river basin scale. The proposed transformations will then be evaluated in order to define the possible implications and how they can be resolved.

Ecosystem Services Assessment
Ecosystem Services Assessment is an approach that deals with the evaluation of the benefits that nature and ecosystems provide to the human society (Häyhä & Franzese, 2014). Therefore, during the politicize step of my project, it is crucial to assess and evaluate the way the proposed transformation performs under this framework and how different values, whether those are environmental, social and economic have been enhanced through a resilient water resource management.

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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)?

It is important to note that those reflections are based on a project that is yet incomplete, therefore they might be subject to change as my analytical and design processes continue.

Relation to studio topic

The Transitional Territories studio focuses on the topic of "Altered Nature: Poetics of Change", specifically dealing with the dynamic interplay between altered landscapes and the projected future of territories, highlighting how human-induced development and exhaustive consumption of resources are unsustainable in the long run, during times of climate change.

My graduation project topic can be directly linked to those themes since the former floodplains of Thessaly function as large operational landscapes of the primary sector, providing not just for the region but are of national importance. The intensification of agriculture in the Thessalian plain in order to increase production has led to processes of terraforming, specifically the drainage and subsequent restoration of Lake Karla, which result in extreme consequences in cases of natural disasters, specifically flooding. Often, these processes are not a product of ignorance, but of deliberate manipulation of natural systems. The plains have been reclaimed and reconfigured and the water system and water cycle have been manipulated and appropriated by human actors in the Thessalian plain in order to support the productive agricultural landscapes. Nature has been constructed and deconstructed,

often ignoring the local knowledge and "site-specific histories of more-than human ecologies" (Muñoz Sanz and Katsikis, 2023). Consequently, the saturation of the natural ecosystem has led to the loss of the landscape's generative capacities, which combined with the rapidly changing climate patterns are resulting in the increase of the flooding risk in the area.

The goal of my project aligns with the overall aim of the studio to imagine alternative futures through transformative actions that demand a paradigm shift in mentalities, reaching a state of environmental co-management. Specifically, my project thoroughly focuses on the examination of conditions (spatial, material, socio-environmental) defining limits that define spaces of potentiality for transformation – the critical zones – and then uses those spaces to test adaptive strategies that enhance the area's resilience to flooding while preserving the local values of human and natural ecosystems.

Relation to Urbanism master track and MSc AUBS master programme

My project is also related to the Urbanism master track since it examines the situated conditions of the area of Thessaly, and how their alterations has resulted in this form of spatial organization. These conditions concern systems such as – among others – geomorphology, hydrology, land management and the human habitat. It is true that this is not an urban project, but my reasoning for this is founded in the notion that these agricultural – formerly floodplains and wetlands – landscapes are part of an urbanization process. Finally, the relation to the MSc AUBS master programme is that this project deals with the human and "built" (specifically constructed and de-constructed) environment, adopting a multi-disciplinary approach, while incorporating elements of design that aim for a more sustainable future of the region of Thessaly.

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

Societal relevance

This project's societal relevance lies in the way local sensitivities are recognized within a flood risk and water resource management framework. Specifically, it aims to protect the livelihood of the local communities which rely heavily on agriculture; therefore, also contributing to Greece's food security. Furthermore, the societal relevance is also highlighted with the effort to align local adaptation practices with centralized land management policies, through finding the best possible pathway for design implementations that is informed by both, yet also aims to reframe them, catapulting a paradigm shift that will lead to a more sustainable and evolutionary resilient future to water extremes, addressing short term and long-term challenges. All of this is calibrated under the lens of an ecosystem-based adaptation, recognizing and supporting the dynamic relationship between human and natural ecosystems. Finally, achieving environmental co-management is directly contributing to the survival and well-being of both human and non-human actors.

Scientific and professional relevance

This project's scientific relevance is expressed through the effort to provide a new understanding of risk literature, analysing the disciplines of hazard, vulnerability and exposure. Specifically, this project is trying to assess Thessaly's flood risk through the examination of physical, environmental, social and economic conditions and alteration processes they have undergone, in order to define the system's limits (biophysical and socio-technical). The proposed methodology of overlaying the spatial manifestations of those limits with the aim to define the potentialities for transformation and then testing possible design strategies with site-specific design implementations from the local to the regional scale could provide a contribution to the current research for climate change adaptation from the lens of urban planning and could also inform resilient models for integrated water resource management. Consequently, this methodology tested through this case study could provide a future reference for urban planners of an innovative framework for adaptive planning.

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