

Graduation Plan

Master of Science in Architecture, Urbanism & Building Sciences

MSc Landscape Architecture 2023 - 2024

Marijn Jonas Vreriks



Graduation Plan

Submit your Graduation Plan to the Board of Examiners (Examencommissie-BK@tudelft.nl), your mentors and delegate of the Board of Examiners one week before the P2 date at the latest.

I Personal information

Full name	Marijn Jonas Vreriks
Student number	5450837

II Studio / Lab information

Name / Theme	Flowscales, Landscape Principles	
Main mentor	Denise Piccinini	Landscape Architecture
Second mentor	Anne Loes Nillesen	Urban Design
Argumentation of choice of the LA graduation lab	Freedom of design choice and location within the studio and creating a better understanding of the theoretical framework of landscape design.	

III Graduation project

Title of the project	Embracing Fluidity. <i>Following Waterways for More Balance in the Mississippi Delta.</i>
Context and aim of the project	
Location (region/area/site)	Mississippi Delta, Louisiana, USA
Problem statement	<p>The Mississippi Delta is one of the many Deltas in the world that has to deal with challenges and problems including, flooding, salinization, lack of space, and the complexity of water management. Before human settlement in the Mississippi Delta, the Delta relied on its natural system of the river carrying sediments and depositing it in the Delta. This is a slow process that is influenced by natural factors, the course of the river and its (dis)tributaries determined the shape of the land, but were also determined by the already deposited sediments and of what was taken away by the sea. But once human permanently settled in the Mississippi Delta they modified the natural system, a <i>Anthropogenic system</i>. Building levees, dams, and navigation channels determined now the shape of the Mississippi Delta. These structures were opposed to exploit the richness of the Delta, agriculture, shipping, production, and fossil industries. The modification of the water system and the extraction industry caused sediments of the river to disappear into the Gulf of Mexico, leading to land loss. With the land loss the balance in the natural system of the Delta was disturbed, leading to increase of floods, decline in ecology, local industries, and cultural identity of the Delta. The Anthropogenic system and the extraction industry are directly making the Mississippi Delta vulnerable with their actions.</p> <p><i>The Mississippi Delta has been converted to the will of humans, this is what we call Anthropogenic system, for exploiting the richness of the Delta. But what they didn't consider that with this exploitation they disturbed the balance of natural</i></p>

	<p><i>systems in the Delta, leading to decrease of the Deltaic value. With the pressing issue of urbanization, sea level rise, and increase of temperatures Deltaic areas have to rely on balance in the natural system. In a relative quick period of time the delta has lost sediments to the Gulf of Mexico causing declined in size, and which eventually resulted in loss of local economies, identity, and ecological value. This is a direct effect of the Anthropogenic system that has ignored the natural system.</i></p>
Research question(s)	<p>The problem is rooted in the complexity of natural systems that have been transformed by human interventions. Therefore rethinking the water management systems and a shift in how to treat and perceive water is needed. But the complexity of systems that come together in the delta is difficult to oversee and difficult to solve only by opposing one question that would need to overcome this complexity this research by-design thesis, will take one perspective on the problem. In this thesis, sedimentation will be the central subject since sedimentation is at the core of the natural system and can give tools for future changes based on 'letting the natural system regain control' (Lewis, 2023).</p> <p>From the introduction and the problem statement, the following research question is opposed;</p> <p>"How can nature-based solutions be used to improve the balance between, a thriving natural system and strengthen local identities?"</p> <p>To support this research question the following sub-questions are made.</p> <p>"How did the current water system (management) come to be and who are the stakeholders/actors involved?"</p> <p>"What lessons can be taken from land loss restoration projects in other Delta projects around the globe?" (To take into account achievements made in similar situations to be applied in the Mississippi Delta.)</p> <p>"What will make the Mississippi River more resilient, from whom and how to achieve this goal?"</p> <p>"What are the necessary measures to (re)establish a sediment flow convenient for the ecology and human settlements in the attempt to create an alternative identity for the region?"</p>
Design assignment	<p>We can no longer sustain the <i>Anthropogenic system</i>, enlarging and heightening levees, pumping water out of urbanized areas and agriculture fields, dredging, and extracting fossil fuels will not be able to last and overcome the current problems of the Mississippi Delta. Therefore the Mississippi River Delta should become once more a thriving natural system, and the Anthropogenic system should fit within the Delta. This means allowing the Delta to follow its course and define its path. This can cause conflicts with the <i>Anthropogenic systems</i>, therefore there needs to be a framework wherein both systems can thrive. The natural system can sustain safety against flooding, restore ecological values, and boost local economies, and the cultural identity of the Delta. In essence, this means that the current layout of the Mississippi Delta should be rethought or re-modeled, due to land loss, and climate change some parts of the Delta are not resilient and will not</p>

	<p>be able to become resilient in the future. Accepting this strategy means accepting that part of the Delta can disappear in order to let other parts of the Delta thrive or to be rebuild. The following aspects will play a central role in the design choices:</p> <ul style="list-style-type: none"> - Ecology - Local economies - Flood safety - Cultural identities
--	--

IV Graduation process

Method description

By looking at the development of the water system, from natural to (human) controlled, a better understanding is created.

Defining the problems through scales, in categories of national, regional, and local the relation between the problems becomes clear and the needed actions to change these elements become concrete. Firstly, a literature study is done of current reports, theses, news articles, and research to determine the problem statement and understand the complexity of the MRD, its development and current problems.

From this understanding, different scenarios are visualized individually, by isolation of the design elements the complexity of the MRD becomes clearer, this is called research by design.

By looking at what kind of changes each element creates and influences each other (positively or negatively) the relation between the scales and elements becomes clear.

Making choices is important in this process, which means that a certain hierarchy of importance should be created between the design elements, to create a design.

According to this hierarchy (which we can call vision), an interdisciplinary design is created.

Literature and more applied references

The research question is answered through literature research, historical analysis, GIS (geographic information system), research by design, and research through design. This is a mix of quantitative and qualitative approaches. Which will lead to design intervention scenarios.

These methods have been used to produce evidence-based scenarios. Based on the literature study the problem statements are created and defined by stakeholders and elements of influence. The relations between the subject and the delta are made and the complex system is understood by literature study, from mainly (Chamberlain et al., 2018; Day & Erdman, 2018), scientific and non-scientific. Subsequently, historical analysis was used to investigate landscape history, with natural and manmade changes that have been resulting in land loss of the delta, explained in (Barry, 1997). This has been done because the needed solutions require a change of the current system, but the cultural value of the landscape must be taken into account. Based on literature research, the conditions and factors that influence the probability of success for sediment restoration and creation have been investigated. Based on this knowledge, the high-potential areas for wetland restoration or creation have been mapped out.

Case-studies and research articles are used to support the design choices, a few examples are; Ruimte voor de Rivieren (NL) (Sijmons et al., 2017), Living With Water (New Orleans) (Waggonner & Ball, 2023), Anthropocene

River Campus; The Human Delta (School of Berlin design Studio) (Haus der Kulturen der Welt et al., 2023), and the Book of student designs 'Delta Interventions' (Nillesen et al., 2016).

See reference list (bibliography) at the end of this document.

V Reflection on the project proposal

1. What is the relation between your graduation topic, the lab topic, and your master track?

The complexity of a Deltaic area asks for the understanding of a system between multiple scales, national, regional, and local, and the impact of elements in the system if changed (their agency). The focus of the Landscape Principles lab is scale-continuum, which can be explained as designing through different scales, for example, the national, regional, and local scales. A clear relation between the location and topic. Further, the Landscape Architecture discipline is focused on how landscapes, such as a Delta, function and how to design with systems (water, infrastructure, ecological, etc.). In addition, Landscape Architecture also focuses on climate adaptation and climate resilience of landscapes, to make a more liveable future for all.

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

Delta areas all over the whole world are under pressure, because of urbanization, climate change, and the increase of population. Delta areas are of great importance for the human population, economically, and the current worldwide systems (food, energy, travel, knowledge). These pressing issues endanger life in the Delta. This design thesis can open up new perspectives in how to deal or work with the complexity of a Delta, these perspectives can be implemented in other Delta's if they are fitting in the context of the Delta.

Bibliography

Chamberlain, E., Törnqvist, T., Shen, Z., Mauz, B., & Wallinga, J. (2018). Anatomy of Mississippi Delta growth and its implications of coastal restoration. *Science Advances*, 4(eaar4740), 1-9.

Day, J. W., & Erdman, J. (2018). *Mississippi Delta restoration*. <https://doi.org/10.1007/978-3-319-65663-2>

Haus der Kulturen der Welt, Max Planck Institute, & New Orleans Center for the Gulf South. (2023). *Anthropocene River Campus: The Human Delta*. <https://www.anthropocene-curriculum.org/project/mississippi/anthropocene-river-campus-the-human-delta>

Lam, N. S., Xu, Y. J., Liu, K., Dismukes, D. E., Reams, M. A., Pace, R. K., Qiang, Y., Narra, S., Li, K., Bianchette, T. A., Cai, H., Zou, L., & Mihunov, V. V. (2018). Understanding the Mississippi River Delta as a Coupled Natural-Human System: Research methods, challenges, and Prospects. *Water*, 10(8), 1054. <https://doi.org/10.3390/w10081054>

LSU Research Team. (2023). *New study compares human contributions to Mississippi River Delta land loss, hints at solutions*. https://www.lsu.edu/mediacenter/news/2023/03/06ored_twilley_bentley_landloss_nature.php#:~:text=The%20study%20found%20that%20only,Mississippi%20River%20Delta%20land%20loss.

Nillesen, A. L., Kothuis, B., Meyer, H., & Palmboom, F. (2016). *Delta interventions* (1ste dr.). Delft University Publishers.

Sijmons, D. F., Feddes, Y., Luiten, E., & Feddes, F. M. (2017). *Ruimte voor de rivier*.

Tectonics, P. (2023). *History of Levee Building on the Mississippi River*. <https://www.climate-policy-watcher.org/plate-tectonics/history-of-levee-building-on-the-mississippi-river.html>

Waggoner & Ball. (2023). *Living with Water*. <https://wbae.com/living-with-water-2/>

Writer, M. S. | S. (2023). *Levees, oil wells biggest causes of Barataria Basin land loss: Study*. https://www.nola.com/news/environment/barataria-wetlands-losses-linked-to-levees-oil-wells-study/article_de229522-bc50-11ed-9d59-1f48c1681222.html#:~:text=A%20new%20study%20of%20the,to%20oil%20and%20gas%20activity