Graduation Plan

Master of Science Architecture, Urbanism & Building Sciences

Graduation Plan: All tracks

Personal information	
Name	Liaw Su Xin
Student number	5091993

Studio		
Name / Theme	Flowscapes- Urban Ecology & Ecocities	
Main mentor	Nico Tillie	Landscape Architecture
Second mentor	Andy van den Dobbelsteen	Climate Design & Sustainability
Argumentation of choice of the studio	Growing up in a hustle and bustle city, every opportunity to be outdoors for leisure and fun becomes really treasured. Be it climbing an adventure tower to get a close to the rustling leaves or building a little sand dike only to let it be taken away by the waves the next moment. The light-hearted nature of play brings me comfort, peace and connects me with my environment. I feel that I am part of nature. That is the power of play. It is simple and innate. Can play do more? The benefits of play for children development has been established by comprehensive researches. But I wonder about the potential of play in mitigating the problems of today's cities. With the current problems of climate change, dwindling biodiversity and disassociation of people and their environment, play might just be the solution. My fascination for ecological playscapes and research theme of ecological design with a balanced city ecosystem direct me towards this Urban Ecology and Ecocities studio. I am interested in finding out how we can look for opportunities in urban settings to integrate biodiversity and to allow flora and fauna to flourish. From large scale green networks to meso-scale infrastructure network and building integration, there are many opportunities for habitat creation and diversity inclusion. I strongly believe that the benefits of ecosystem services would allow us to reimagine the quality of urban living. Also, to understand urban metabolism as an interweaving network of humans, flora, fauna and our environment and seek the benefits reaped.	

Graduation project	
Title of the graduation project	A Biodiverse and Resilient Playscape
Goal	
Location:	Delft University of Technology, Zuid Holland, The Netherlands
The posed problem,	With rapid urbanisation and urban sprawl, natural habitat areas are disappearing from and around cities. Biodiversity in Netherlands is rapidly declining with 70% reduction of species since the 1900. TU Delft is part of the Ranstad region which surrounds the Groene Hart and an important green-blue connector between The Hague and Rotterdam. Within TU Delft, areas around the faculties are extensive paved while green areas are mostly monoculture lawn with a few trees. There is a lack of biodiversity in TU Delft due to the limited opportunities to accommodate other species. With the added pressure of climate change, TU Delft is experiencing more intense precipitation

	and longer drier periods. The inability to cope with the increase in stormwater result in flooding and damage to life and property. Meanwhile, during dry periods in summer, there is the problem of drought and low water level. These not only threaten water quality with blue-green algae growth but also affect health and productivity level. With a lack of a stimulating environment, people might not realise that they are part of nature, but rather, see themselves as a unique entity independent from their environment. With the lack of appreciation and ownership for their environment, unhealthy practices for the urban ecosystem continues leading ultimately to an unsustainable living environment.
research questions and	The situation has led to the exploration of the thesis which intends to investigate a possible framework to create a biodiverse and climate adaptive TU Delft campus through the use of 'playful design'. The sub research questions are: -What are the principles/ theories concerning resilience and biodiversity? -How can 'playful' design bring about biodiversity and climate resilience? -What is the current situation in TU Delft? How do we apply landscape architectural frameworks to TU Delft? How would a biodiverse, resilient and playful campus look like?
design assignment in which these result.	The aim is to create a vibrant and fun campus city for all with an ecosystem that supports other species apart from humans. The campus should also be able to cope with heat and water stress with its self-regulating system. The result of the design assignment can be described as following: - A toolkit for a biodiverse and resilient playscape. This is formulated by literature reviews and case studies and can be applied to other site areas as a general guideline. - Scenario based design, envisioning of TU Delft as a biodiverse campus through a few scenarios of climate diverse campus, water campus, forest campus, etc… - An ecological masterplan for TU Delft campus. Green NL scoring for current and with proposed masterplan - Specific site design of a chosen area with more elaborate detail design of materialization and flows - Future proofing hypothesis through testing design with situation of extreme flood and heat condition.

Process

Method description

Methods

CLARIFY MOTIVATION

- State inspiration and have a supporting ideal image visualisation

UNDERSTANDING CURRENT SITUATION

- **Landscape historical development.** Mapping the evolution of the greater region (Hague-Rotterdam region) to understand the changes in landscape type and the human relation to their surroundings.
- **Site historical development.** Mapping the history of site (TU Delft) to understand the significant moments that shaped the campus to what it is today
- **Layered approach** on (Delft) city level and (campus) site level. Understand the workings of different components: Historic alignment, soil type, transit mobility, built structure, green structure, water management
- **Mapping Ecology (environment)** Landscape types & habitat mapping in the regional and city scale. To identify existing habitats and potential network connection. Mapping of different green types and trees in the site to have a richer understanding of the green infrastructure in site.
- **Mapping Ecology (species)** Inventorisation of 20 fauna species, their habitat types and food web for selected species.
- **Site typology**: Landscape characteristics classification of site. To simplify the site into a set of main features
- **Categorisation of built environment.** Evaluation of buildings in (campus) site based on their contribution to green and blue structure
- **Mapping of spatial quality and experience.** To understand how people interact with their environment.
- **Creating design principles & toolbox.** The design principles are generated from case studies and literature reviews. The toolbox is a set of spatial design from small to regional scale influenced by the different typologies of the site.
- **NL Green Label rating** of a selected area. To identify areas for improvement.

SYNTHESISING CURRENT SITUATION

- List out the opportunities and challenges of the site

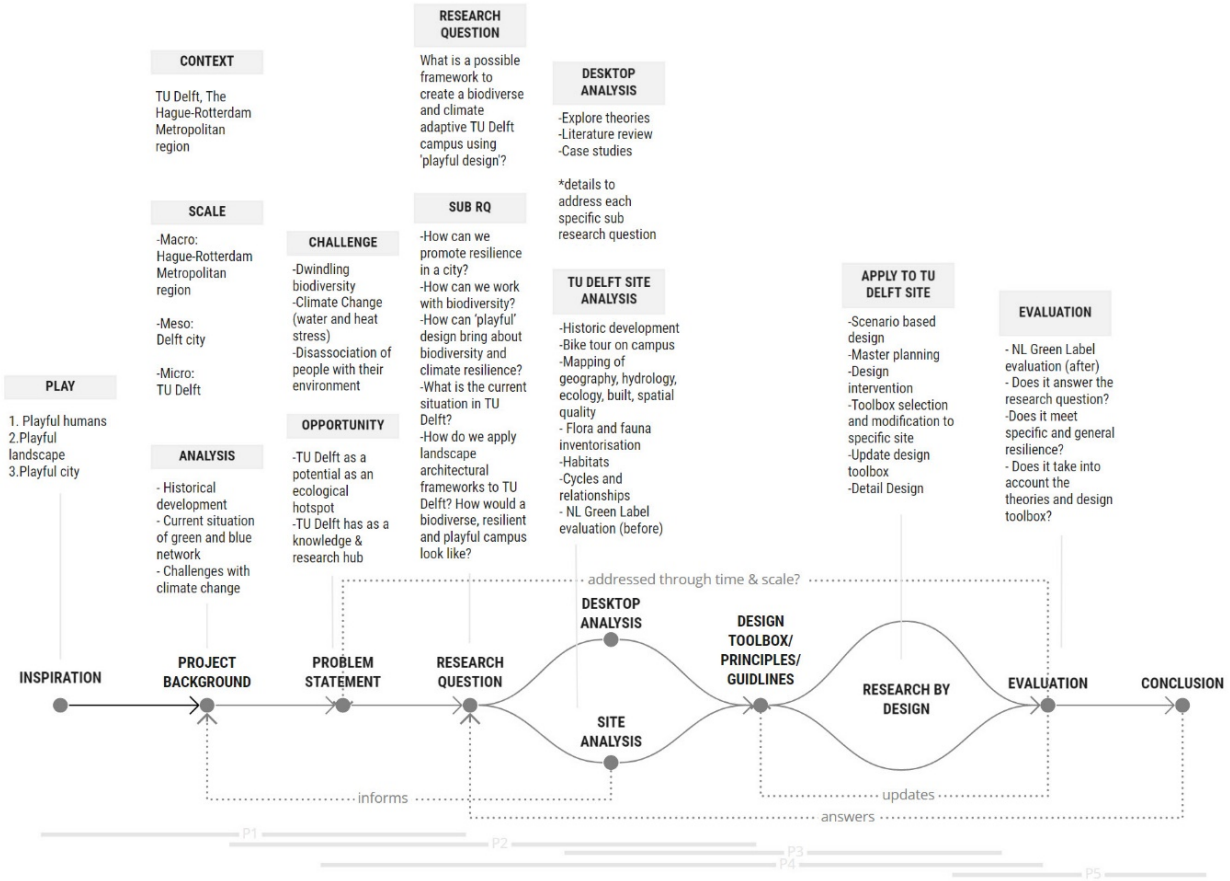
GOAL AND VISION SETTING

- Selection of opportunities and challenges to work on
- State vision for the broader context and also the aim of project

RESEARCH BY DESIGN

- **Vision mapping exploration** for regional scale and campus
- **Scenario-based design exploration** (diverging) for selected fauna species. To reimagine the campus if the species was the key user instead of humans.
- **Selected site area**. Specific area in the campus is identified with stakeholder, Rene Hoonhout the Green Manager of TU delft.
- **Application of design principles & toolbox.**
- **Resilience evaluation**. Evaluation of ability to cope with extreme heat and water stress. Explained with flow diagrams and plans.
- **Get users response**. To understand if design creates a ludic and stimulating environment, get users input through design implementation and observation and if not possible, a survey using before and after images.
- **NL Green Label rating**. Evaluate performance of design intervention

Project Plan



Research Question, Sub Question and Approach

Research question	Sub question	Approach
"What is a possible framework to create a biodiverse, climate resilient TU campus city using 'playful' design?"	What are the principles/ theories concerning resilience and biodiversity?	Theory of Ecological Resilience Theory, Wu & Wu (2013) Patch-Corridor Theory Importance of urban ecology with Ecosystem services, (Stads Natuur Maken) Extract key principles of Urban Climate Resilience through case study of 100 resilient cities (Singapore and Rotterdam)
	What is play? Why should we have 'playful' design?	Literature review of Homo Ludens and Aldo van Eyck Understand Urban Play design through journal of The playful city constructing a typology for urban design interventions- Gabrielle Donoff & Rae Bridgman (2017) Manifesto for a Playful City, Carma Masson (n.d.) Well Played, Gordon (2014)
	-How can 'playful' design bring about biodiversity and climate resilience?	Case study of playful ecological/resilient design: Poptahof, Speeldernis, Roombeek Form tool kit from the case studies Research by design: Classification of trees/helophytes/ design based on spatial form types and 5 senses
	What is the current situation in TU Delft?	Layer approach- Dirk Harmen Frieling Readings to understand the historical context of Delft Macro regional scale mapping Meso Delft city scale mapping TU campus layer analysis • flora and fauna inventorisation • habitats • cycles
	How do we apply landscape architectural frameworks to TU Delft? How would a biodiverse, resilient and playful campus look like?	Research by design: Scenario-based design, Design through scale

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Literature and general practical preference

1. Bolund, P., & Hunhammar, S. (1999). Ecosystem services in urban areas. Ecological Economics, 29(2), 293–301. https://doi.org/10.1016/S0921-8009(99)00013-0
2. Daanen, H. A. M., W. Jonkhoff, P. Bosch, & H. Ten Broeke. (2013). The effect of global warming and urban heat islands on mortality, morbidity and productivity in The Netherlands. Pages16-19.
3. Eden, J. M., Kew, S. F., Bellprat, O., Lenderink, G., Manola, I., Omrani, H., & van Oldenborgh, G. J. (2018). Extreme precipitation in the Netherlands: An event attribution case study. Weather and Climate Extremes, 21, 90–101. https://doi.org/10.1016/j.wace.2018.07.003
4. Elmqvist, T., Setälä, H., Handel, S., van der Ploeg, S., Aronson, J., Blignaut, J., Gómez-Baggethun, E., Nowak, D., Kronenberg, J., & de Groot, R. (2015). Benefits of restoring ecosystem services in urban areas. Current Opinion in Environmental Sustainability, 14, 101–108. https://doi.org/10.1016/j.cosust.2015.05.001
5. Fabrique. (n.d.). 100 years of Dutch summers: The clock is ticking on climate change. AMS. Retrieved November 25, 2020, from https://www.ams-institute.org/news/100-years-of-dutch-summers-the-clock-is-ticking-on-climate-change/
6. Gordon, G. (n.d.). Well Played: The Origins and Future of Playfulness. American Journal of Play, 6(2), 33.
7. KNMI. (2015). KNMI'14 climate scenarios for the Netherlands (p. 36).
8. LUZ Architects. (2016). Groen Blauw Delft Zuid Oost (p. 24). Gemeente Delft.
9. Manifesto for a Playful City—An Essay—Carmamasson.com. (n.d.). Retrieved December 10, 2020, from https://cargocollective.com/carmamasson/Manifesto-for-a-Playful-City-An-Essay
10. Millennium Ecosystem Assessment (Program) (Ed.). (2005). Ecosystems and human well-being: Synthesis. Island Press.
11. PBL. (2010). Biodiversity mean species abundance between 1700-2000. Netherlands Environmental Assessment Agency. www.pbl.nl
12. Posad Spatial Strategies. (n.d.). TU Delft Spatial Development Perspective TU Campus 2019-2029 (p. 57). Delft University of Technology.
13. Robinson, S. L., & Lundholm, J. T. (2012). Ecosystem services provided by urban spontaneous vegetation. Urban Ecosyst, 13.
14. Ruff, A. R. (1987). Holland and the ecological landscapes 1973-1987: Vol. Volume 1. of "Urban and Regional Studies". Delftse Universitaire Pers.
15. The Rockefeller Foundation. (2020). 100 Resilient Cities. 100 Resilient Cities. http://100resilientcities.org/cities/
16. Vink, Jacques, Piet Vollaard, Niels de Zwarte, and Jacques Vink. 2017. Stads Natuur Maken: Making Urban Nature. Rotterdam: Nai010 uitgevers/.
17. Wu, J., & Wu, T. (2013). Ecological Resilience as a Foundation for Urban Design and Sustainability. In S. T. A. Pickett, M. L. Cadenasso, & B. McGrath (Eds.), Resilience in Ecology and Urban Design (Vol. 3, pp. 211–229). Springer Netherlands. https://doi.org/10.1007/978-94-007-5341-9_10

Reflection

The project is situated in the theme of sustainable ecocities. As cities expand rapidly throughout the world, the importance of urban ecology becomes more urgent than ever. The project aims to promote a new way of transforming and designing our cities and discover new ways of approaching urban nature through an ecological perspective. It bridges across different disciplines of hydrology, landscape architecture, sociology, environmental engineering, climate design and sustainability. With the case studies, the project supplements the research data on ecological and resilient playscape. The project aims to generate a framework which becomes relevant as a guide to be applied to other areas when striving for a biodiverse, climate adaptive playscape. Using TU Delft site, the project provides an insight on the application of the framework and showcases how a biodiverse and resilient campus might look like together with the potential of it.

The project's research and the design component approach landscape architecture as an interdisciplinary field with many interacting components of complex relationship between entities. The project employs a multi-layered understanding of landscape, by accounting for the design across time and scale, the palimpsest layers and the spatial structure. The project respects and builds upon the Genius Loci and translate relevant ecocity principles and biodiversity challenges into the specific site in TU Delft.