

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	Lei Qi
Student number	5545951

Studio		
Name / Theme	Urban Ecology	
Main mentor	Nico Tillie	Urban Ecology, Landscape Architecture
Second mentor	Remon Rooij	Spatial Planning & Strategy
Argumentation of choice of the studio	<p>I am interested in processes and patterns in an urban context, as well as in dynamic feedback between humans and other interacting components. I want to understand and explore how humans interact and influence their local environment and how humans can make some positive interventions and sustainable management in a human-dominated landscape.</p> <p>Urban ecology is the study of the relationships between living organisms and their environment in urban areas. It aims to understand how urbanization affects ecosystems and the species that inhabit them, and how we can design and manage cities in a way that is sustainable and beneficial for both people and the natural world. That is the exactly topic I want to explore in my graduation year.</p>	

Graduation project	
Title of the graduation project	Refresh ——Cultivating a new paradigm of integrated farming as mitigation of air pollution in Chiang Mai, Thailand
Goal	
Location:	Chiang Mai, Thailand
The posed problem,	<p>Air pollution is one of the world's largest health and environmental problems. Thailand is one of those countries suffering from the severe effects of air pollution and it is particularly acute in northern Thailand.</p> <p>Chiang Mai is the largest city in northern Thailand, the capital of Chiang Mai province and the second largest city in Thailand. Lately, Chiang Mai has been annually facing adverse health</p>

	<p>impacts of airborne PM during the dry season burning for over 20 years. During burning season, from February to April, Chiang Mai and the surrounding areas are settled over by thick and stifling fog. Two major factors are responsible for it. One is farmers would burn off the agricultural residue to clear the field for next round of crops. Another one is that fire is deliberately set in forest because it would be easy for farmers to clear the land to start new crop cultivation, for foragers to collect hed thob mushroom and for hunters to gather wild animals. The particles from combustion cannot be dispersed easily because it locates in a basin-shape flat plain but surrounded by mountain ranges on eastern and western sides. Therefore, the concentration of harmful substances in the air is high and the yearly air pollution has been a serious threat to the health of the local residents.</p>
<p>research questions and</p>	<p>Research question:</p> <p>How to cultivate a new paradigm of integrated farming practice as mitigation of air pollution in Chiang Mai through tailoring sustainable agriculture system and sustainable landscape framework in the context of southeast Asia?</p> <p>Sub-questions:</p> <ul style="list-style-type: none"> - How does a regional strategy framework incorporate regional and local agricultural system to control the source of air pollution? - How to cultivate a new relationship between farmland and urban expansion that provides a sustainable crop production network? - What kind of sustainable production mode can improve the living conditions of local residents without harming the ecological environment? - What kind of sustainable cultivation pattern of crops can be practiced in farmland in the context of Southeast Asia? - What is the most efficient local vegetation species and planting pattern to remove air pollution in urban area?
<p>design assignment in which these result.</p>	<p>In response to problem statement and research question, mitigate air pollution issue by controlling the source of air pollution, guiding the flow to dissipate the haze and removing airborne pollutant. The process including research, analyze and design will be considered in multiple scales.</p>

	<p>Regional Scale:</p> <ul style="list-style-type: none"> - Regional landscape architectural strategy/framework incorporating regional and local agricultural system to control the source of air pollution linked to stakeholders - Regional vision which applies strategies in spatial level <p>Local Scale:</p> <ul style="list-style-type: none"> - Sustainable production mode - Sustainable cultivation pattern - New paradigm of urban farming <p>Small Scale:</p> <ul style="list-style-type: none"> - Detailed design of streetscape and home garden in the selected sites with local vegetation selection and planting pattern, providing spatial perception and experience <p>With all the outcomes from multiple scales, this project could be one case study for those areas which suffering from air pollution issue as well in the similar context.</p>
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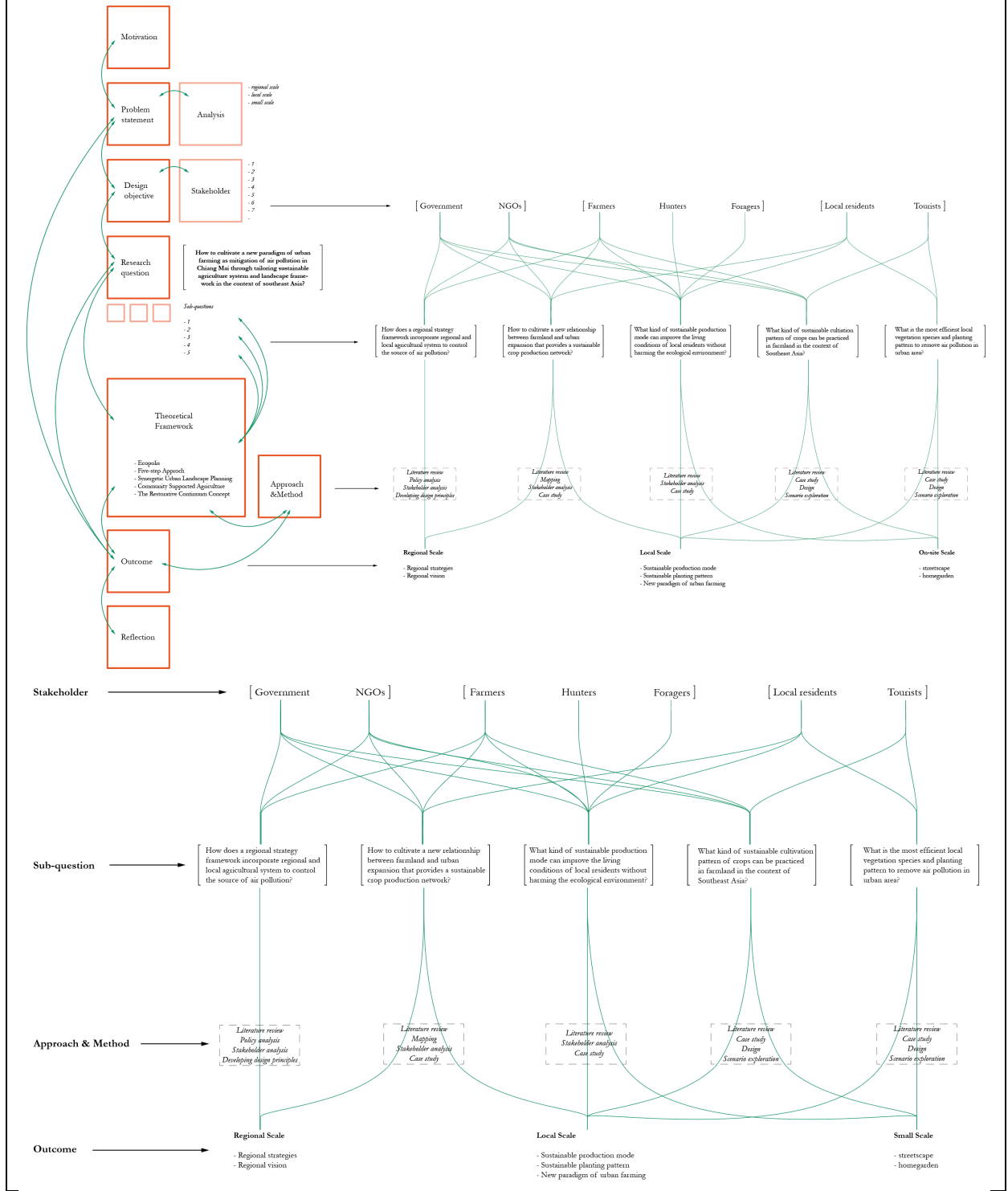
Process

Method description

Due to the complexity of the project, the analysis framework and design process will be done in multi-scale: regional scale, local scale, small scale. At the same time, through the analysis of stakeholders from different fields, the main research question can be decomposed to several sub-questions, which can be handled in a more focused way because different stakeholders have different positions on the same issue and can provide different ideas and skills from different perspectives and fields. Thus, the research methodology is an integrated framework with interdisciplinary knowledge in multi-scale.

- **Government/NGOs (Non-government Organization):**
Government can develop strategies and policies to promote sustainable agriculture and encourage diversification of agricultural production. NGOs can use their expertise in multiple fields to help farmers customize sustainable production mode and sustainable crop cultivation pattern. They can launch urban greenery campaign to increase people's awareness of environmental issues.
- **Farmers/Foragers/Hunters:**
For those who cause air pollution in urban area, it is essential to understand the reason why they do so. In this case, they deliberately set fire in forest and burn agricultural residues in open field to make profits better. Thus, considering their primary purpose, providing them with new sustainable production mode would be a better alternative, not only bringing higher profits but also minimizing the impact on the natural environment.

- Local residents/Tourists: The most fundamental need of local residents and tourists is to be able to breathe fresh, pollution-free air. Accordingly, how to remove air pollutants with urban greenery will be one of the important parts of this project.



Literature and general practical reference

Theory:

Forman, R. T. (2014). Land Mosaics: The ecology of landscapes and regions (1995). *The ecological design and planning reader*, 217-234.

Forman, R. T. (2014). *Urban ecology: science of cities*. Cambridge University Press.

Latham, G. (2020). Goal setting: A five-step approach to behavior change. In *Organizational Collaboration* (pp. 10-20). Routledge.

Roggema, R.E. (2012). Swarm Planning: The Development of a Spatial Planning Methodology to Deal with Climate Adaptation. <https://doi.org/10.4233/uuid:629daea-9975-4ec4-a5a0-23e6714cd35e>

Tillie, N. (2018). Synergetic urban landscape planning in Rotterdam: Liveable low-carbon cities. *A+ BE| Architecture and the Built Environment*, (24), 1-284.

Problem statement:

Chen, M., Dai, F., Yang, B., & Zhu, S. (2019). Effects of urban green space morphological pattern on variation of PM_{2.5} concentration in the neighborhoods of five Chinese megacities. *Building and Environment*, 158, 1-15.

Cohen, P. T., & Pearson, R. E. (1998). Communal irrigation, state, and capital in the Chiang Mai Valley (Northern Thailand): twentieth-century transformations. *Journal of Southeast Asian Studies*, 29(1), 86-110.

Marten, G. G. (1986). Traditional agriculture in Southeast Asia: a human ecology perspective.

Srinurak, N., & Mishima, N. (2014). The impact of urban sprawl on cultivated area in river city of Chiang Mai. In *International Symposium on Lowland Technology*; Saga University: Saga, Japan (pp. 1-8).

Tanabe, S. (1981). *Peasant farming systems in Thailand: a comparative study of rice cultivation and agricultural technology in Chiangmai and Ayutthaya*. University of London, School of Oriental and African Studies (United Kingdom).

Villa, P. M., Rodrigues, A. C., Martins, S. V., de Oliveira Neto, S. N., Laverde, A. G., & Riera-Seijas, A. (2021). Reducing intensification by shifting cultivation through sustainable climate-smart practices in tropical forests: A review in the context of UN Decade on Ecosystem Restoration. *Current Research in Environmental Sustainability*, 3, 100058.

Case study:

Fei Dai, Ming Chen, Bo Yang, Peiyuan Sun, Lu Ding, Jiafeng Wang, Wenpei Li. Particulate Matter Mitigation Through Urban Green Infrastructure: Research on Optimization of Block-scale Green Space. Huazhong University of Science and Technology. <https://www.asla.org/2020awards/466.html>

Junhui Zhang, Hanyun Jiang, Yimiao Yao. Return of Land Rights: Land Restoration After Avocado Fever. Chongqing University. <https://www.asla.org/2021studentawards/3603.html>

Kurt Culbertson, Jason Ficht, Xiaojian Fan, Chen Liu, Zachary Zabel, Nate Hines, Edward Wranosky, James Komen. Air Quality, Placemaking and Spatial Equity: The Fontana Urban Greening Master Plan. Southern California Association of Governments and the City of Fontana <https://www.asla.org/2020awards/105.html>

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)?

Along with urbanization, urban ecology has been becoming more and more important in the field of landscape architecture. Urban ecological design aim at promoting a more sustainable and resilient approach to the design and management in the built environment. It involves ecology, aesthetics, socio-economics, etc. Urban ecological design is not just about designing for people, but designing for ecological and environmental health, and even for social and economic justice. All factors from different fields work synergistically to improve the environmental conditions and the people's quality of life in urban area.

My graduation thesis is about exploring sustainable solutions to air pollution. The environmental pollution has been serious due to urbanization, however, some existing approaches cannot address the root cause of the problem. As an interdisciplinary subject, landscape architecture can provide sustainable and resilient approaches that are applied at the spatial level. Eventually, all the outcomes would benefit humans and the environment in which they live. In my case, by cultivating a new paradigm of urban farming as mitigation of air pollution in Chiang Mai through tailoring sustainable agriculture system and landscape framework, farmers and related people would reach their goal of earning high profits, local residents and tourists would be able to breathe fresh, pollution-free air, local environment would improve, local flora and fauna would flourish, and all element would be in harmony with each other.

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

Social

As one of the world's largest health and environmental problems, air pollution has been becoming a threat to health of people all over the world. The aim of my graduation thesis is to create a new paradigm of urban farming as mitigation of air pollution. The proposed sustainable agriculture system and landscape framework can be replicated elsewhere within southeast Asia to handle environmental issue.

Urban ecology can have significant impacts on the quality of life for people living in cities, including through the provision of green spaces, the promotion of sustainable development, and the reduction of environmental health risks. My graduation work in urban ecology could therefore contribute to a better understanding of how to design and manage urban landscapes in a way that benefits both people and the natural environment.

Professional:

This project deals with developing strategies and policies, agriculture, ecology, and economic and social factor, with stakeholders from public, institutional, and academic sectors involved. Through the interaction of different stakeholders, three scales of design proposals and landscape interventions will be applied in spatial level. Besides, people's awareness of sustainability and nature-based principle would be raised during the process of developing solutions to air pollution issue.

Landscape architects play a key role in the design and management of urban landscapes, and my thesis project could help to advance the profession's understanding of how to create sustainable and livable cities. It could also provide valuable insights for landscape architects looking to incorporate principles of urban ecology into their work.

Scientific:

Urban ecology is an interdisciplinary field that draws on a range of scientific disciplines, including ecology, geography, urban planning, and environmental science. My graduation project could contribute to the body of scientific knowledge in this field and help to inform the development of more sustainable and resilient urban landscapes with the familiar methodology, and research by design.

Overall, an urban ecology has the potential to make significant contributions to a range of social, professional, and scientific contexts, and could help to shape the future of urban landscapes in a way that is sustainable and beneficial for both people and the natural environment.