ARCHITECTURE

TRACKS &
PROGRAMS

ONLINE MUSEUM

THEMES

instruction

online museum   2019 2020

Welcome to the joint exhibition of graduation projects from TU Delft's Urbanism, Landscape Architecture, Geomatics, and EMU programmes.

The **Urbanism** track is informed by the rich tradition of Dutch spatial planning which inspires students to work in multi-disciplinary ways to create integrated solutions for the built environment.

Landscape Architecture addresses spatial issues inspired by nature, art, and technology, enabling students to create compositions and processes that work across different scales and time.

Geomatics for the Built Environment deals with spatial knowledge about the built environment; students learn how to use advanced data-collecting techniques, analysis, information modelling, and visualisation to apply geographic data to real-world problems in innovative ways.

Finally, **EMU** (European Post-master in Urbanism) is an advanced masters' programme jointly run by TU Delft, KU Leuven, UPC Barcelona, and Università IUAV di Venezia, which adhere to the specifically European tradition of urbanism as a collection of socially responsible disciplines that aim at improving the living conditions of all citizens.

These final presentations represent work produced by the students during their final year (or, in the case of EMU, final semester). The projects presented here are located all over the world; they showcase not only what the students have learned, but also represent the culmination of years of hard work, research, analysis, design, and the development of presentation skills they have learned while doing their masters' studies at TU Delft.
The presentations also illustrate the learning processes by which students have engaged with the complexities of designing and planning cities and landscapes.
By combining research, design, and planning, and by focusing on multiple levels of scale (e.g. local, regional, interregional, and international), they demonstrate original thinking on the problems they chose to investigate; they also propose potential solutions that illustrate their design and analytical skills, as well as their relevant professional and place-based knowledge.

Finally, these projects also demonstrate the students' ability to present their work, and the learning processes represented by these projects show how the students have developed the academic and professional skills required for them to take their place in the world as urban designers, planners and researchers.

We hope you enjoy the museum and its graduation master pieces!

online museum   2019 2020

information regarding the represented study tracks can be found on these websites.

[Department of Urbanism](#)

EMU
  [Track EMU](#)

Geomatics
  [Track Geomatics](#)
  [Linkedin](#)
  [Twitter](#)

Landscape
  [Track Landscape](#)
  [Student experiences](#)

Urbanism
  [Track Urbanism](#)
  [Student experiences](#)

URBANISM

LANDSCAPE ARCHITECTURE

GEOMATICS

EMU

WEST

main page

CIRCULAR WATER STORIES

GARDEN OF GELDERLAND

HARVEST

PEARL RIVER DELTA

URBAN FOREST

OTHER

CIRCULAR WATER STORIES

Tanvi Gupta
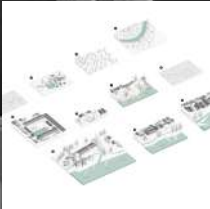

Amina Chouairi

Naeema Ali

Jiawei Zhao

María José Zúñiga

Camilla Di Nicola

Monica Veras Morais
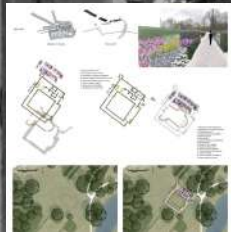
GARDEN OF GELDERLAND

Alia Shahed

Li Qian

Ming Jiang

Huiying Liu

Beiqi Yuan
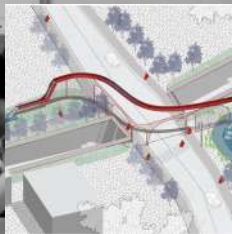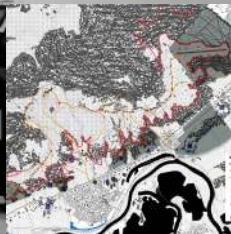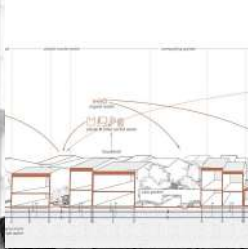
Yingjie Zhang

Yuyu Peng

Barsha Amarendra

Mengchi Wei

Yanjiao Wang

HARVEST

Xuan Liu

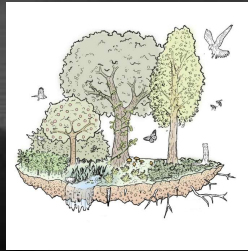Purvi Sanil

Marcello Corradi

Matthijs Hollanders

Lok Yan Chu

Yueqi Tang

Rohaan Teli

PEARL RIVER DELTA

Marina Rani
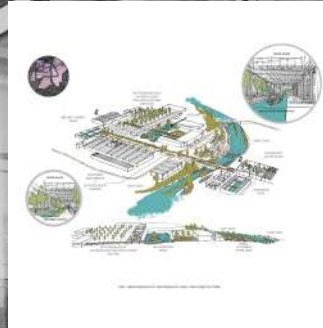
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Margherita Ghini

Xinyan Zhao
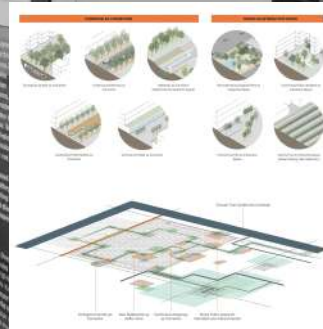
Jiajun Wu

Tapasya Mukkamala
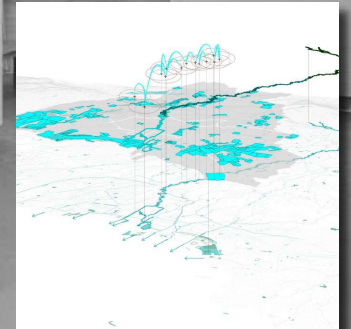
URBAN FOREST

Jianing Liu

Emma Kannekens
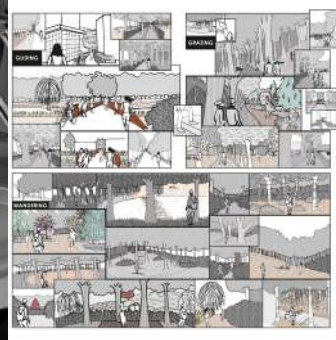
Machteld Zinsmeister

OTHER

Georgia Gkratsou

Hei Yi Fong

Pik Lam Theodora Ho

Linyu Qu
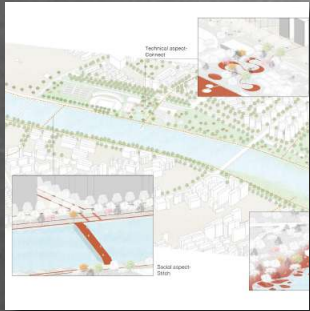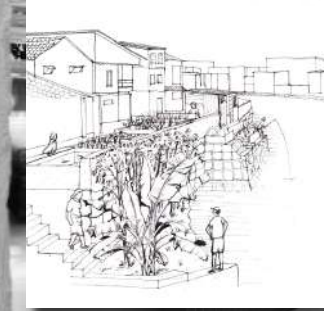
Jeroen Stroetzel

Angelina Popova

DESIGN OF THE URBAN FABRICS

PLANNING COMPLEX CITIES

TRANSITIONAL TERRITORIES

URBAN METABOLISM AND CLIMATE

DESIGN OF THE URBAN FABRIC

Anna Myllymäki

Linde Jorritsma

Kavya Suresh

Yiqi Ding
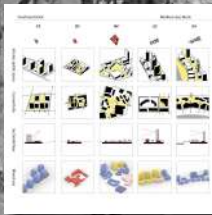
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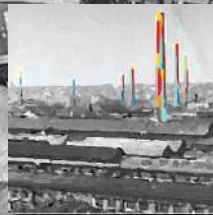
Sebastien Reinink
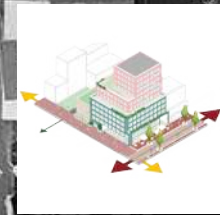
DESIGN OF THE URBAN FABRIC

Sylvan Muijlwijk

Dhushyanth Ravi

Widasari Yunida Putri
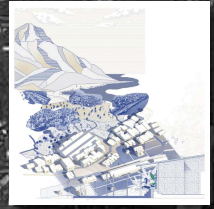
Lieke Marijnissen

Jian Yuan

Shanghai 2019

Rick Schoonderbeek

PLANNING COMPLEX CITIES

Anna Klimczak

Franka van Marrewijk

Maria Symeonidi

Lisa-Marie Laub

Jie Zhao

Shuangyun Chen

Surabhi Khandelwal
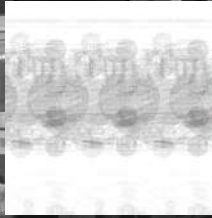
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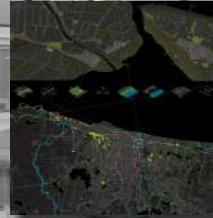
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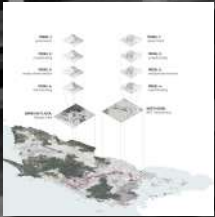
Shuxin Chi

Raul Martinez
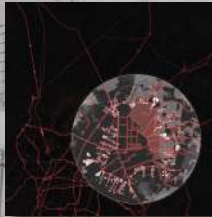
Sankarnath Pothannoor Mukundan

PLANNING COMPLEX CITIES

Eleni Maria Koskeridou

You Wu

Lize Oldenkamp

Rotem Shenitzer Schwake

Shu-Yu Lin

Qiaojia Zhang

Elisa Isaza Bernhard
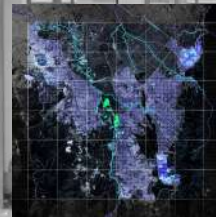
Henry Endemann

Anne van Bergen
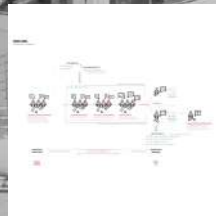
Dor Cohen

Qian Yu
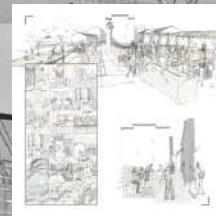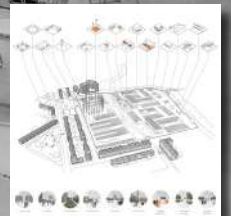
Marieke de Bode

TRANSITIONAL TERRITORIES

Boaz Peters

Ioanna Virvidaki

Mark Slierings

Prinka Anandawardhani

Jun Chen

TRANSITIONAL TERRITORIES

Stefano Agliati
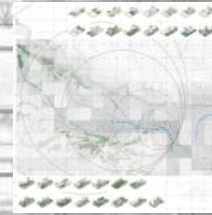
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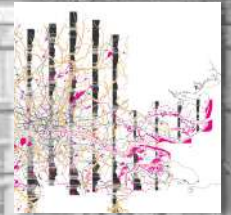
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Thomas Dillon Peynado
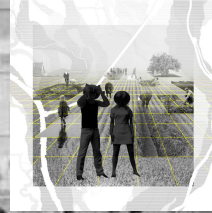
Isabel Recubenis Sanchis

Nicole Garcia Vogt

URBAN METABOLISM
AND CLIMATE

Charlotte von Meijenfeldt

Lakshmi Baiju

Malavika Gopalakrishnan

Yulin Song

Hanwen Hu

Teun Claassen

Yiran Li
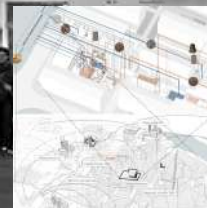
Amber Mulder

Celine Jansen

Felix Dahle

Gabriela Wiersma
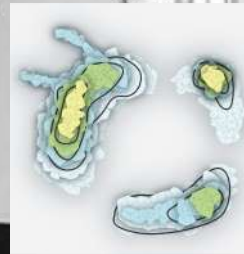
Willem van Opstal

Imke Lánský

Karel van Oordt Montalvo
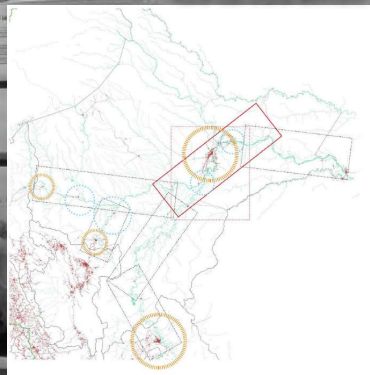
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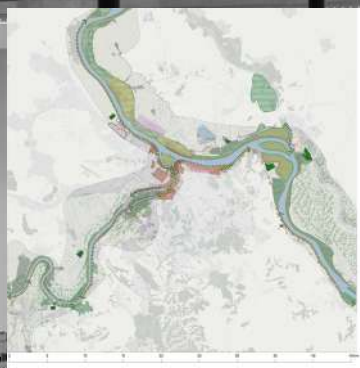
46 projects, 9 will be selected.

Which TU-Delft projects will make it

to the Archiprix National?

expo

SHAPING UNCERTAINTY

EXPLORING INFORMALITY

FOSTERING LIVEABILITY

SHAPING UNCERTAINTY

Karel van Oordt Montalvo
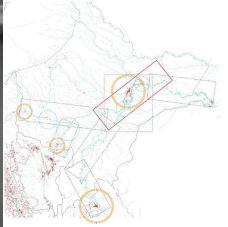
Amina Chouairi

Nicole Garcia Vogt

Alia Shahed

Rotem Shenitzer Schwake

Felix Dahle

EXPLORING INFORMALITY

Tapasya Mukkamala

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Naeema Ali

Linyu Qu

Lieke Marijnissen

Isabel Recubenis Sanchis

Matthijs Hollanders

Widasari Yunida Putri

Imke Lánský

Franka van Marrewijk 2019	Anne van Bergen 2019	Lisa-Marie Laub 2019	Sarantis Georgiou 2019	Marieke de Bode 2020	Anna Myllymäki 2020	Jeroen Stroetzel 2020	Mark Slierings 2020	Thomas Dillon Peynado 2020	Lize Oldenkamp 2020	Anna Klimczak 2020	Boaz Peters 2020	Dhushyanth 2020	Linde Jorritsma 2020
Teun Claassen 2020	Camilla Di Nicola 2020	Elisa Isaza Bernhard 2020	Jiajun Wu 2020	Qian Yu 2020	Sebastien Reinink 2020	Imke Lánský 2020	Yingjie Zhang 2020	Mengchi Wei 2020	Xinyan Zhao 2020	Yulin Song 2020	Yiran Li 2020	Shu-Yu Lin 2020	Hanwen Hu 2020
Malavika Gopalakrishnan 2020	Lakshmi Baiju 2020	Sankarnath Pothannoor Mukundan 2020	Felix Dahle 2020	Henry Endemann 2020	Hei Yi Fong 2020	Linyu Qu 2020	Marcello Corradi 2020	Yueqi Tang 2020	Celine Jansen 2020	Dor Cohen 2020	Xuan Liu 2020	Jun Chen 2020	Anneliese Fuchshuber 2020
Georgia Gkratsou 2020	Pik Lam Theodora Ho 2020	Nicole Garcia Vogt 2020	Tanvi Gupta 2020	Isabel Recubenis Sanchis 2020	Jian Yuan 2020	Yiqi Ding 2020	Raul Martinez 2020	Maria José Zúñiga 2020	Marina Višić 2020	Rohaan Teli 2020	Amina Chouairi 2020	Karel van Oordt Montalvo 2020	Alia Shahed 2020
Stefano Agliati 2020	Shuxin Chi 2020	Jahnavi Bhatt 2020	Ioanna Virvidaki 2020	Kavya Kalyan 2020	Matthijs Hollanders 2020	Barsha Amarendra 2020	Lok Yan Chu 2020	Margherita Ghini 2020	Bo Peng 2020	Kavya Suresh 2020	Surabhi Khandelwal 2020	Shuangyun Chen 2020	Rotem Shenitzer Schwake 2020
Maria Symeonidi 2020	Qiaojia Zhang 2020	Judit Taraba 2020	Lieke Marijnissen 2020	You Wu 2020	Widasari Yunida Putri 2020	Rick Schoonderbeek 2020	Willem van Opstal 2020	Emma Kannekens 2020	Jie Zhao 2020	Jianing Liu 2020	Naeema Ali 2020	Prinka Anandawardhani 2020	Li Qian 2020
Charlotte Von Mijenfeldt 2020	Purvi Sanil 2020	Machteld Zinsmeister 2020	Tapasya Mukkamala 2020	Monica Veras Morais 2020	Yuyu Peng 2020	Sylvan Muijlwijk 2020	Amber Mulder 2020	Gabriela Wiersma 2020	Jiawei Zhao 2020	Eleni Maria Koskeridou 2020	Marina Rani 2020	Ming Jiang 2020	Huiying Liu 2020
links	Angelina Popova 2020	Beiqi Yuan 2020	Yanjiao Wang 2020										main page

Amazon Way
Karel van Oordt Montalvo

Growth oriented Development in the Peruvian Amazonia commodifies its biocultural diversity. Thus, inscribed in a path dependent of unfulfilled promises of local development, the Amazon Waterway Project seeks to create an international trade chain connecting produce from Manaus in Brazil to China through the four most important Peruvian Amazonian rivers.

In such complex context, the execution of the Amazon Waterway Project represents both a risk of widening the territorial unevenness gap and a challenge for creating alternative development. In this regard, the research shows the relevance of spatial planning and design looking upon the talents, opportunities and knowledge of the territory to create new shared understandings and alternatives for a holistic development that pursues social and ecological wellbeing by involving local and global agents, as well as reframing big scale infrastructure projects as integral development opportunities.

Therefore, a landscape economy strategy is envisioned at multiple scales as a point of departure for a co-creation process involving a series of interventions, guides, protocols and dialogue spaces towards the construction of an Amazon Pact that nurtures a complimentary relationship of Amazonian cities and communities.

EMU
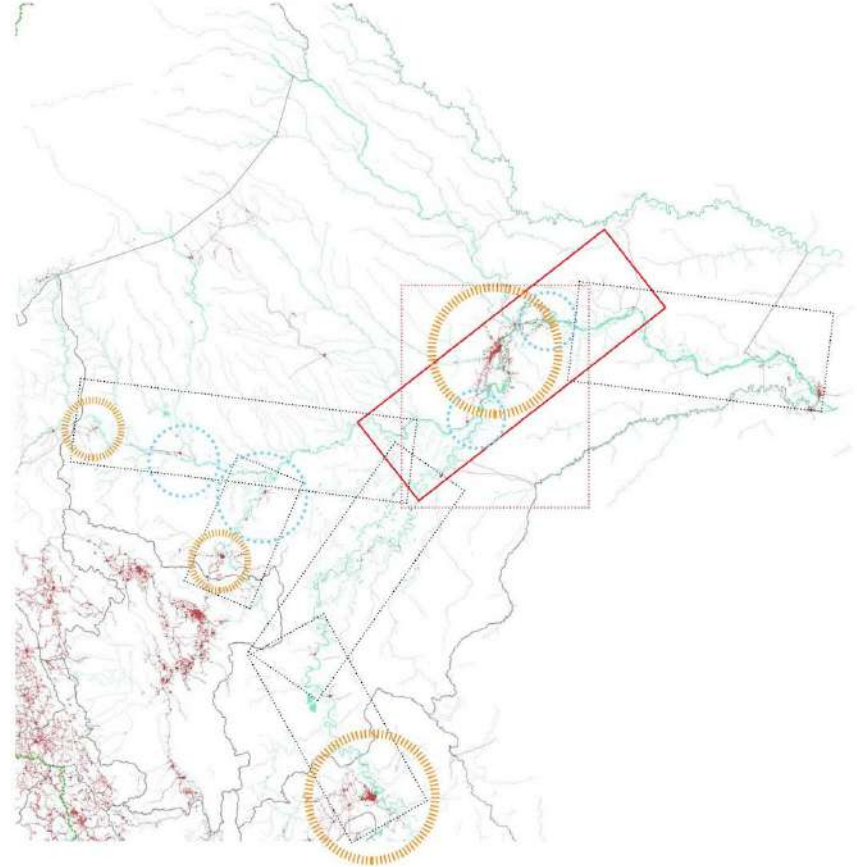
The Operating Venetian Lagoon: The Agency of Barene

Amina Chouairi

Transitional territories such as lagoons are among the most impacted and delicate environments, threatened by the combined effects of climate change and human action. The thesis aims to address the Venetian Lagoon hydromorphological sufferance, the state of neglection of its secondary islands, and the over-engineered flood defence design as crucial issues. From the research conducted, emerges clearly the need for redefining the role of the entire Venetian Lagoon in the next future, shifting its role from passive, being exploited and consequently damaged, to active, able to sustain resiliently the rest of the territory. In order to do so, the main strategy to be pursued is to reinforce the "barene" landscape, the brackish marshlands, fundamental for the hydromorphological and ecological survival of the lagoon. Therefore, the goal of the thesis is to employ the agency of "barene" to mitigate the impact of anthropic and natural threats, acting as a nature-based flood defence (function), to recover hydromorphological sufferance (flow), and to support the cultural, ecological and productive heritage (form), making the Venetian Lagoon function as a sustaining landscape infrastructure. The "barene" act as pivotal means to achieve a comprehensive vision for the Venetian Lagoon where functions, flows, and forms are implemented and designed as part of a unique co-operating system.

The central area of the Venetian Lagoon is chosen as project site, being the most damaged hydromorphologically. Having researched on how natural forces (tides, winds, etc.) influence this portion of lagoon, different combinations of under-water and above-water concave structures are designed in harmony with these forces, to promote accretion. In the most compromised cases, the structures are partially supported by initial dredges. The islands of the central lagoon become the perceptive points from which experience the transformation of this new landscape. In the end, the intertwined system of "barene" and islands, once matured sufficiently, will produce a beneficial effect over the hydromorphological, ecological and biodiversity, and cultural surrounding environment.

Through the process of research by design, the project seeks to mitigate the threats of relative sea level rise in the Venetian Lagoon; provide a nature-based flood defence; create brackish marshland's habitat for ecosystem restoration; invest in alternative forms of slow-tourism and foster different duration of stay in Venetian lagoon; enrich local community livelihood and economical vibrancy. Moreover, the project wants to consolidate and enhance the cultural image of the Venetian Lagoon, consisting of the diffuse sense of horizontality, reflection and visibility conveyed by the diffuse and unceasing water surface.
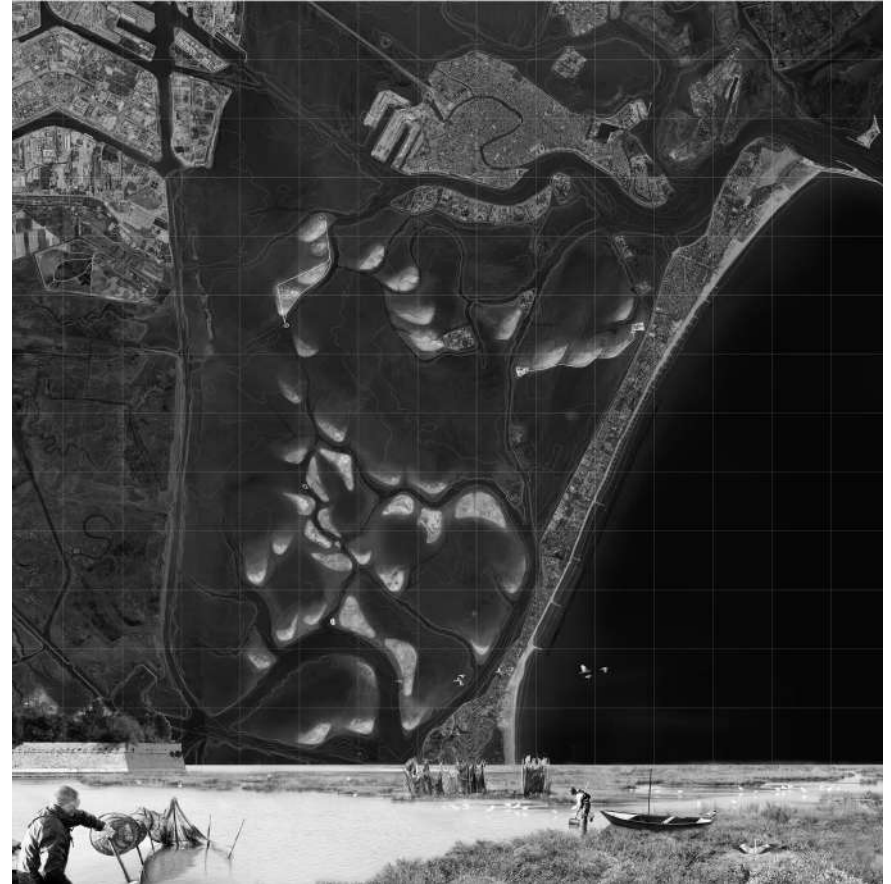
Landscape Architecture

Synchronizing Habitat
Nicole Garcia Vogt

The extreme character of human activities and hard infrastructures in combination with the continuous variation of the climate has triggered an unprecedented fast rate of alterations in the environment. Hereafter the magnified climate change is increasing stress on ecosystems; especially interfaces such as coastal areas are at significant risk. Considering that the North Sea is one of the most urbanized seascapes, we can draw upon its susceptibility to three hazards: inundation, sea temperature rise, and growing harbors. Although an ambiguity will prevail concerning the magnitude and rate of transformations, certainly inundation will cover and drown habitats; that sea temperature rise will decrease water quality due to habitat depletion; and the demand on expanding ports will generate more pollution by ship traffic and big industrial areas. One of the most sensible territories concerning these hazards is the Wadden Sea region, which consists of a large intertidal zone surrounded by high productivity areas and rich marine ecosystems. Here spatial measures have developed from the exploitation of ecology to its conservation, currently, we are looking towards shepherding nature by integrating them into our constructed systems. However, this perspective overlooks the benefits resulting from the synergy by co-habitation of human life, non-human life, and environment. The proposed project recommends looking into a partnership with nature to join the intrinsic dynamics this planet offers, instead of trying to dominate them. This cohabitation could be a chance to synchronize with the changing environmental processes, which might lead us towards adapting progressively to them. The project claims to regenerate the multi- equilibria state of marine ecosystems and develop an evolutionary adaptation through an ecosystem succession approach. This entails the gradual transformation of constantly obsolete infrastructures towards hybrid evolving systems. The idea is to use infrastructures that reintegrate the biodynamics of ecology so that it can be colonized by socio-ecological elements. Hence the interplay of the anthropic designs and environmental processes would support the creation of habitats that allow a shared expansion space for dissimilar activities to meet (ecotone enhancement). To propose such infrastructures it was necessary to understand the dynamics of the different marine ecosystems in terms of time cycles, longevity, and interdependencies. The consideration of this temporal dimension of socio-ecological elements in the design, allows the proposed changes to eventually be coupled to the pace of environmental processes. Hereafter ecosystems could be able to embrace climatic risk since they no longer present a hazard, but a trigger of transformation.

Urbanism
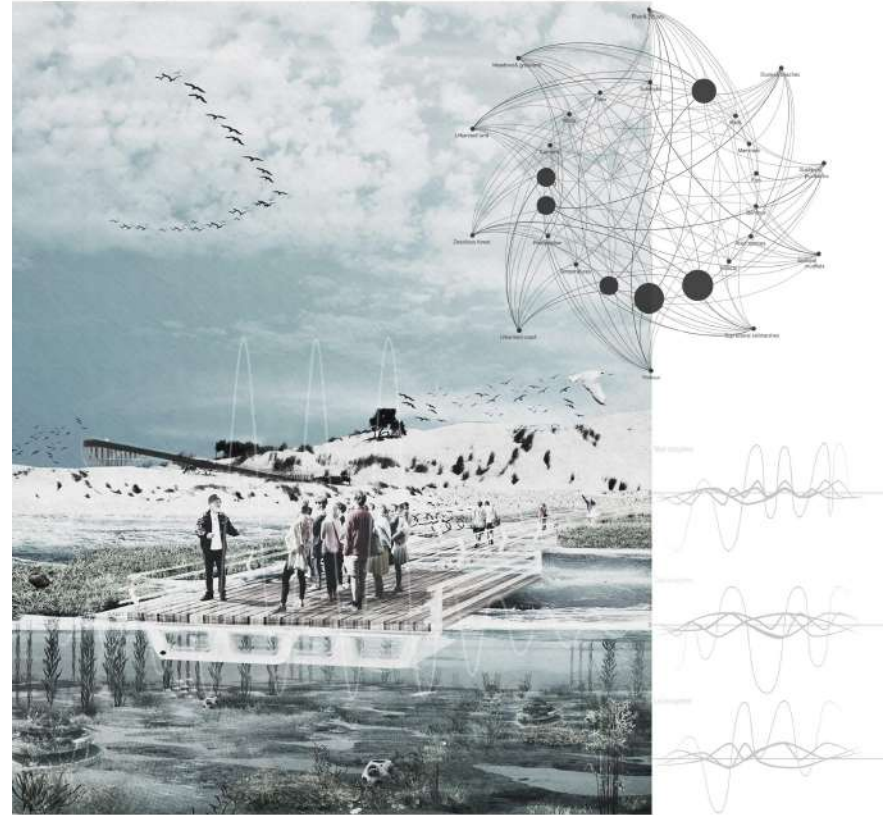
REJUVENATING LINKS:
Estates & Hinterland
Alia Shaded

The intended research and design exploration for resilient heritage landscapes of the future, looks at the heritage estate not just as a composition of a historic building and its garden ensemble but as a centrally organized economic system and a spatial assemblage of living, leisure and production. In the Achterhoek region from the Province of Gelderland, Netherlands, the agricultural lands and the forestry were lifelines of the living and leisure functions of the estates even in the early 20th century.

Today, the richly protected heritage estate zones only cover the estate building and the garden, but the hinterland is not equally seen as an important part of the heritage. Once, the hinterland was an invaluable part of the estate and even during the post WW2 crisis, the estate owners ensured the protection of their hinterlands along with the characteristic features of the cultural landscape of Achterhoek. That is why, there is a need for re-exploring its value and finding new functional and experiential links between the hinterland and the estates.

In the current scenario, the severe scarcity of water in the estate grounds can be seen rather as a possibility for new links. Going back in history of water management, it is found that the productive landscape and its processes have influenced and altered the 'Baakse Beek' (brook system) and the wetness storage capacity of the region especially the East Achterhoek area. Here, a lack of awareness of its impact on the adjacent estate area is noticed. Thus, we find another missing link between the estates and the broader cultural landscape as well. If suitable measures are taken in the productive landscape, this situation might improve. This, in turn, generates new possibilities of re-purposing and revaluing the productive hinterland and restore its link to the heritage estates through different scales.

The problem field leads to the main objective of my research and design which is to rejuvenate links between the estates and the hinterland across scales. Here, the idea of wetness retention in the productive cultural landscape, creates a new possibility of reviving these links.

Landscape Architecture

(Re) Levant
Rotem Shenitzer Schwake

Being a crossroads between Asia, Europe and Africa, with access to the Mediterranean Sea and places with religious importance, this area has been a strategic position for ruling armies looking to establish themselves and gain control in the area. Throughout the years, the Levant region has become a contested region as tensions are long-lasting for almost a century. Today, the Levant region is divided region, characterized by impermeable borders and lack of cooperation and communication between nations. Nevertheless, at the beginning of the 20th century, an extensive railway network connected the Middle East to the West and Africa to an extent that is unthinkable today. Although it was mostly dismantled, traces of this former network are still present in the landscape today and constitute a potential future connection.

This thesis focuses on the former railway network in the Levant region and aims to use it to promote cross-border cooperation, social interaction, and overall sustainability. The thesis relates between the regional division and the deterioration of the historic railway network, based on the understanding that the demolition of railroads, during the mid-20th century, was used as a means to ensure separation between nation-states. The research explores the possibilities and opportunities along the former railway line and its stations. On the regional scale, the research uses the historic railway line to develop spatial planning concepts, a vision and a strategy to promote cross-border cooperation based on shared goals. On the local scale, the research focuses on the historic railway stations as shared spaces, promoting social inclusiveness and interaction, improving mobility and rehabilitation station environments.

This thesis proposal is an of alternative planning - imagining a different future for the Levant region which goes beyond territorial divisions. The thesis offers to reverse the current trend of regional segregation towards collaboration and social interaction. Instead of vertical concrete walls, a past-future railway line will be used as a shared infrastructure going around the region. Instead of checkpoint and watchtowers, the railway stations will act as a network of public spaces where border crossing take place. The TransLevant Express vision revolves around a heritage-based railway line, connecting Africa and Europe, going across the Levant, and continuing east to the Arabian Gulf. The proposed design connects countries, cities, landscapes and citizens, promoting cultural and knowledge exchange, transporting people and goods for tourism, business and commerce, creating interaction and encounter.

Urbanism
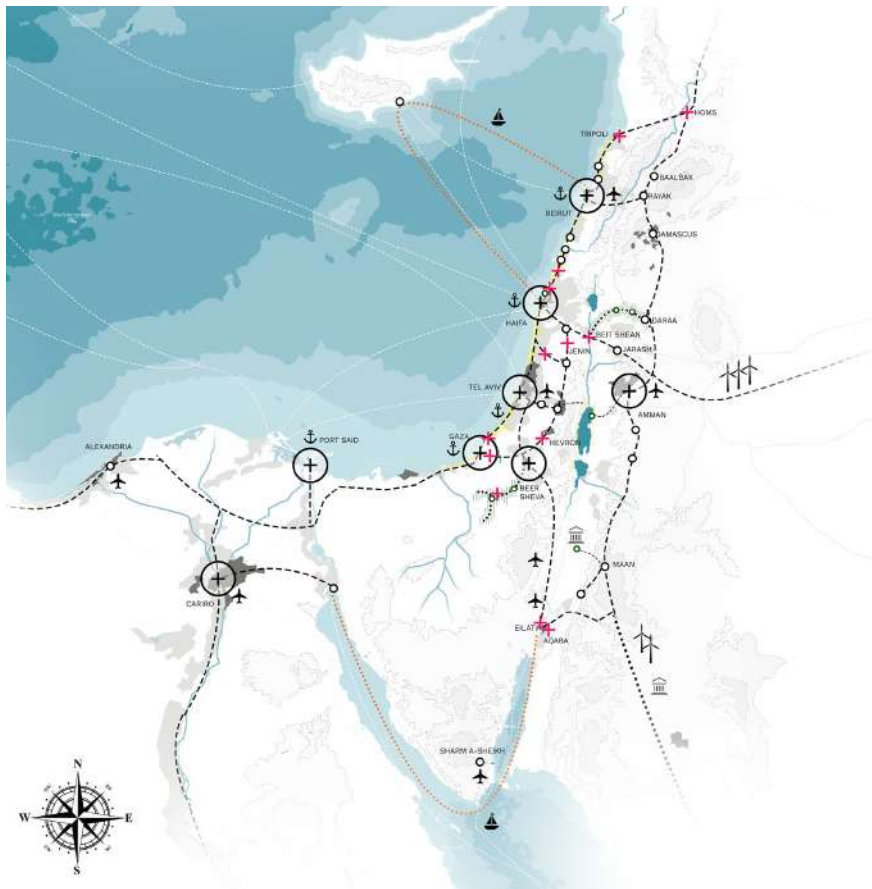
Automatic change detection in digital maps using aerial images and point clouds

Felix Dahle

In many countries digital maps are created and provided by the national cadastres: Usually they consist of multiple polygons, each with an exact location and shape, describing which kind of surface can be found at the position of the polygon (e. g. building, street, vegetation). They must be accurate and well maintained, as they are used by companies or authorities for purposes like urban planning or demographic statistics. However, especially cities are in a constant change. Monitoring these changes is difficult and identifying and updating the virtual maps is still done mostly manually today.

A method is developed to detect changes on the ground and identify changes for the virtual maps automatically using machine learning approaches. As input data the virtual map, their corresponding aerial images and point clouds from different years are needed. As a case study for this thesis, this method is developed and applied to the BGT, the Dutch virtual map with a resolution of 20cm. The research area is the city of Haarlem for 2017 and 2018. High resolution aerial images are used in combination with point clouds created by Photogrammetry.

The output is again a digital map of the area where every polygon has a probability score of how likely its category changed. This can support the manual updating process eminently, as a minor percentage of polygons (for which the algorithm was unsure) must be checked manually. The research question of this thesis is to check whether this change detection is feasible even for highly heterogeneous structures like cities. Many visual changes in the aerial images are happening that are not relevant for the virtual map. In the one year, a street can be full of colourful cars, in the other year, the street is empty and completely grey. Many scenes are easy for humans to distinguish but are challenging for an algorithm. The goal is to detect a high amount of true changes while keeping the number of false positives low to reduce the manual work as much as possible.

To achieve good change detection and answer the research questions, the machine learning library of XGBoost is used. It provides a gradient boosting framework for many different environments, including Python. Many weak learners, each classifying a change only with a very low detection rate are combined to get a strong learner. This learner should be able to classify polygons with a high accuracy into polygons that change and polygons that do not change.

With this method it is possible to detect a high amount of changes. 80% of all changes can be found within a reasonable number of False positives. Especially for buildings almost all changes can be identified. It is furthermore possible to localize the changes in larger polygons.

Geomatics
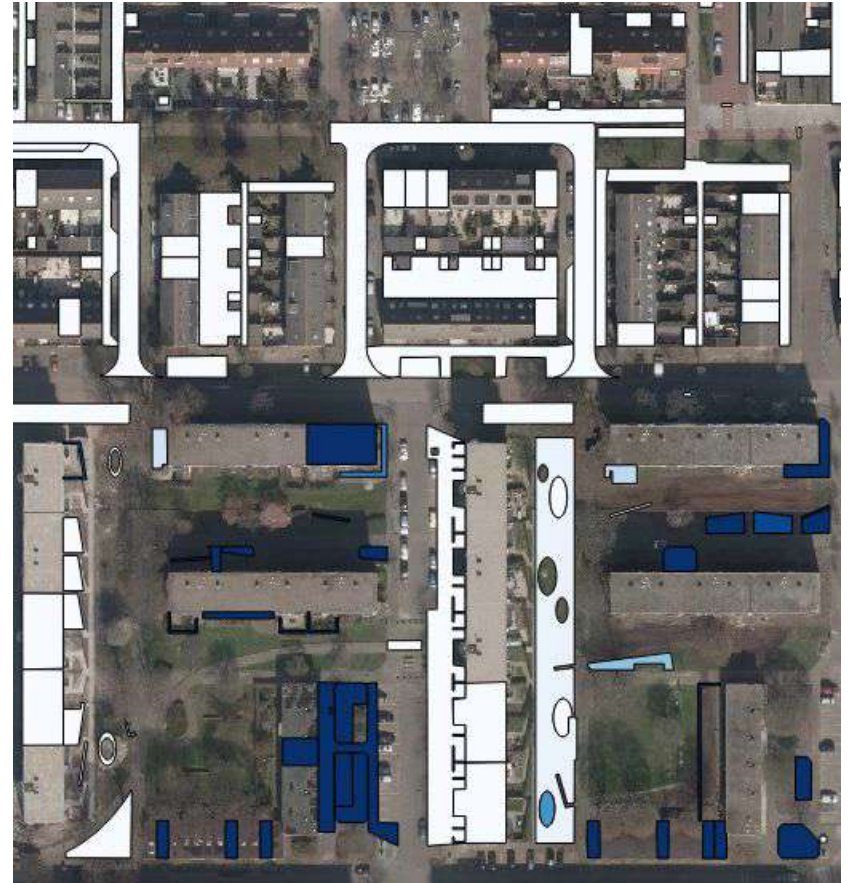
[Mediating] Waterscapes

Tapasya Mukkamala

The phase "water, water everywhere but too much or too little" aptly explains the current situation of many global cities. Within the numerous challenges due to Climate change and Urbanisation, water ranks the highest as a risk to the society. This risk ranges from water related catastrophes like floods to availability of portable water to the growing population. There are many cities in the world that are threaten with this issue. One global city, that witnesses severe water related risks is Jakarta. Jakarta has been reported flooding as early as in the year of 1621 and since then there has various flood events over the years. In the olden times the kampungs and desakotas developed ways to live with the water forming a very sustainable and close relationship with their river system. But as Jakarta grew into a metropolis with problems and focus getting bigger and diverse, the focus shifted to an infrastructure-oriented development with which the perception of the river and kampungs began to change. A lot of alterations were and are still constantly being made to the physical morphology of both the river and the kampungs leaving them without an identity. At present the Kampungs are the "informal trouble" to the city and the rivers are canalized drains of water and waste.

The shift to a constant dependency on linear approaches of flood management and inequity in the planning policies leaves the Kampungs and river network vulnerable to the imbalance in the natural- built systems.

Therefore, the outcome of the project aims to look at an alternate perspective to approach the flood and water management structure of the city of Jakarta. It is done by looking at "urban poor not as a problem but as a part of the solution" to primarily address the issue of flooding. The project also aims to investigate ways to integrate them as a key component of the larger water management schemes. The urban poor in the Kampungs of Jakarta show a strong potential due to the deep engraved sense of community and affinity to the river and its cultural symbolism. These socio-cultural values of the people within the kampungs could be a key factor in bringing about a behavioral shift in the way they treat their rivers or immediate water systems. Bottom-up interventions within these Kampungs integrated with a top-down strategic plan could reduce a significant amount of stress on the river system and improve the socio-ecological values of the river.
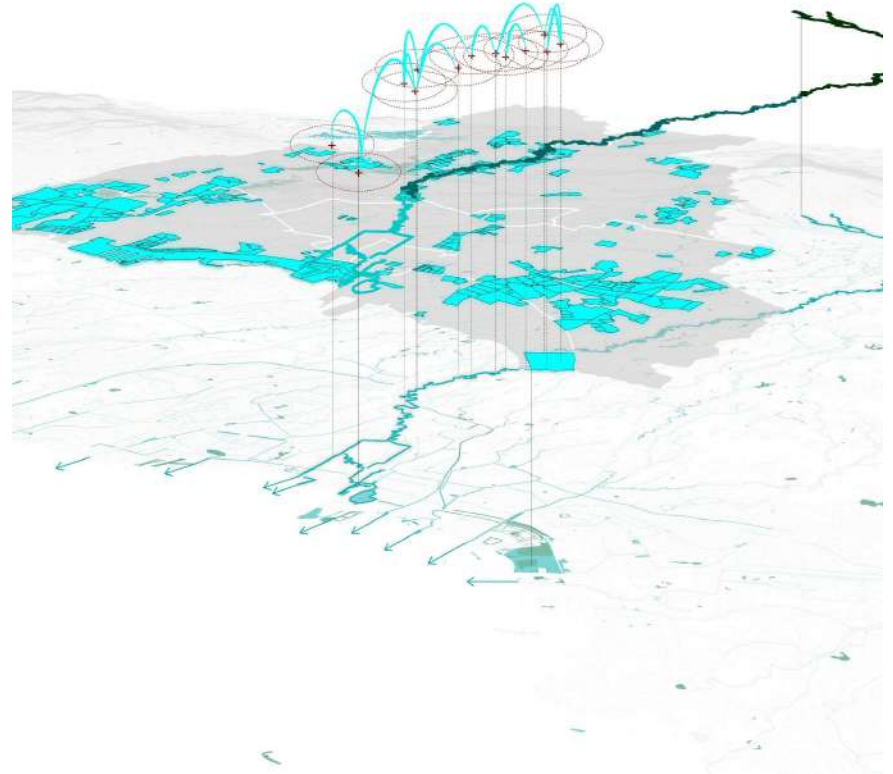
Landscape Architecture

A Moveable Feast in Semarang
Pik Lam Theodora Ho

Semarang is one of the biggest cities in Indonesia under the process of urbanisation, which threatens the underdeveloped capacity of the city. Street vendors booming is an evident phenomenon of urbanisation, it is a new way of urban living to survive in the urban capitalist growth circumstances. Being the majority of the informal sector, street vendors are highly resilient but they also bring environmental impacts to the city and other urban dwellers. The thesis is a process of design by research, research by design to explore urban landscape intervention that facilitate and manage street vendors with an incentive building approach for an inclusive future development.

The thesis is under the Shared Heritage Lab which explores the shared history between The Netherlands and Indonesia in terms of cultural and architectural heritage. It is also a cross disciplinary research between heritage architecture, architectural engineering, landscape architecture and urbanism, collaborated with Institut Teknologi Bandung (ITB) and Rijksdienst voor het Cultureel Erfgoed (RCE) of the Dutch municipality.

Landscape Architecture
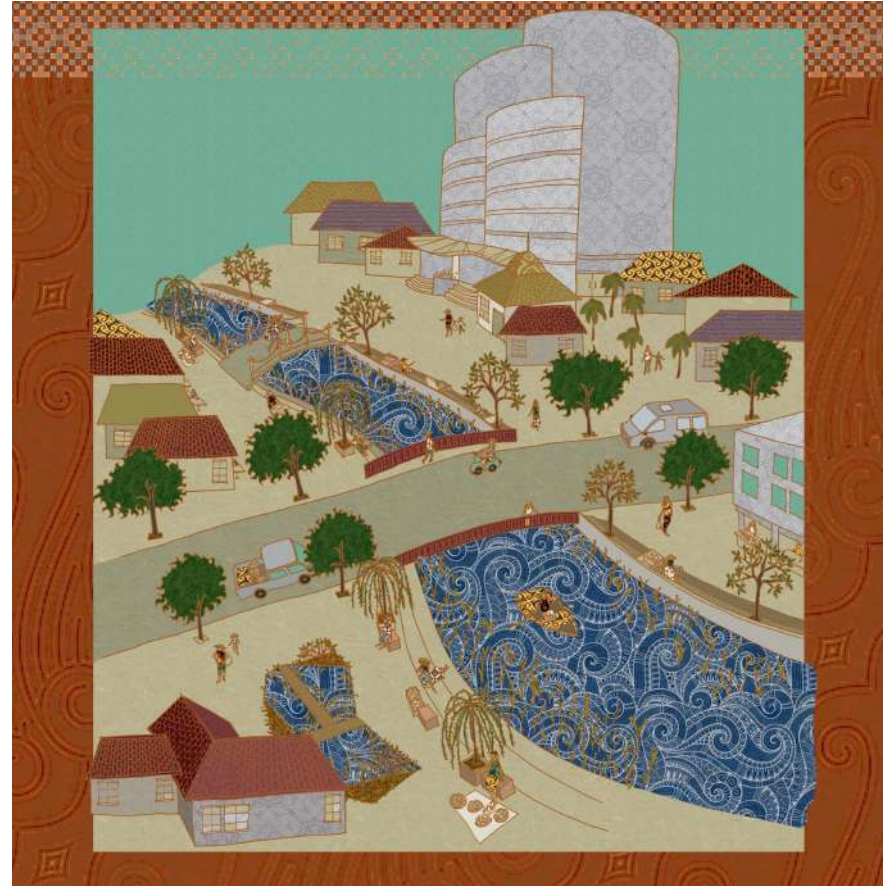
The death and life of Chinatown
You Wu

The advent of steamship in the 19th century is accompanying with the Chinese immigration. Chinese seamen gathered around the dockland at a certain scale and formed Chinese quarters. Therefore, Chinatowns appeared in many harbour cities in European countries. With the urban development and migrant shifts within the recent one hundred years, Chinatowns transformed many times regarding their recognitions, urban roles and functions. However, Chinatowns seem to decline universally. The stereotypic manifestation and commodification have gradually erased the social meaning as an 'ethnic core', and the 'voluntaristic way' to accommodate difference (Peach, 1996). Based on literatures, this thesis defined the spatial dimensions and social constriction of Chinatowns, as well as the concept of integration and authenticity, analysed contextualised problems of Chinatown in Amsterdam, and thereby to reconfigure Chinatown in Amsterdam through the socio-spatial strategies.

Urbanism

Confronting the Norwegian Paradox

Boaz Peters

The thesis describes the development of the oil and gas industry in Arctic Norway. This sudden increase in wealth is causing urban developments and strong inequalities across different scales. Furthermore, it is causing friction between indigenous Sámi and non-indigenous worldviews, sustained within the culturally fragile county of Finnmark. The role of the Norwegian state is notably dubious - both historically and presently – by instating policies aimed at development through a modern lens and wealth from oil and gas extraction – especially in the city of Hammerfest. The fixation of space through this concept is disinheriting indigenous people as well as the climate, landscape and socio-economic state of Finnmark. Reindeer herders have a different conceptualization of time and space, accumulated through centuries of observation and adaptions to the seasonal cycles, and is highly dependent on the flexibility for their herds. Conflicts arise due to increasing urbanization impeding Sámi movement, creating a socio-territorial paradox. Strong uncertainties arise: will the oil and gas industry continue as planned by the Norwegian state? How does this relate to the vulnerable path-dependent relationship with the fossil industry in the future? Will development on the mainland further impede the ability of traditional practices?

Through an understanding of different temporalities within urban planning and indigenous herding knowledge, the argument of the thesis unfolds over an in-depth spatiotemporal and on-site analysis of the island of Kvaløya. I argue that the triangulation of spatial modeling, research by design, cinematographic strategies and the integration of indigenous knowledge can help in improving the agency of mapping. I argue that the we should look more critically at the role of the modus operandi of urbanists and decision-makers, in their capacity of influencing and shaping the conceptual framework on which decision making is based, especially in the highly uncertain and contested territories.

The thesis then moves towards a possible way forward by integrating the (indigenous) knowledge into scenarios through transtemporal and transscalar mapping and 3d modelling. I end by arguing that the incorporation of both practical and conceptual knowledge of the territory and the ability to share and communicate this knowledge between academics, practitioners and stakeholders is critical to confront this uncertainty. The flexible and adaptive knowledge of indigenous people could therefore help into planning and decision-making processes and help to foster trust and build consensus among indigenous and non-indigenous participants for future decision-making. Ultimately it is a tool for creating awareness, action and allowing space for Sámi agency.

Urbanism

A change of view

Celine Jansen

Nowadays, lots of geo-information (GI) is openly available. The value of this information lies in its use. Geoportals play an important part in allowing users to discover and access suitable data for their use cases. However, the user-friendliness of these geoportals is not as it should be. As the communicational layer between a system and its users, a more user-friendly UI can result in a more user-friendly geoportal. In an explorative research methodology involving a literature study into UIs and geoportals, assessing existing geoportals, and a user requirements session, I developed a guideline for user-friendly geoportal UIs: the Geoportal User-Interface Design Evaluator (GUIDE). The elements captured in the GUIDE cover the different parts of the UI: the content presentation, the interaction with available services (system interaction, navigation, search mechanisms, access mechanisms, and communication mechanisms) and the enabling information (metadata and help mechanisms). Concrete implementation examples of these design elements are provided by implementing a mock-up in accordance to the GUIDE. To assess whether or not the elements of the GUIDE result in an increase in user-friendliness, the results of a benchmark usability session are compared to the results achieved during a follow-up usability session with the mock-up. The tasks participants perform during these sessions are all related to the most important reasons why users would visit a geoportal: discovering data, assessing whether the discovered data is suitable for a specific use case, and accessing the data. The comparison of the results of the two usability studies suggests that the elements listed in the GUIDE as implemented in the mock-up indeed result in a more user-friendly geoportal UI. In the adopted usability metric that covered 128 fields related to performance and self-reported metrics, the mock-up outperformed the benchmark in 95 fields. This improvement is confirmed by qualitative comments of the six participants of the usability sessions and by experts of the Dutch geo-platform PDOK. Especially the increase in efficiency is appreciated. Based on the foundation the GUIDE and the corresponding mock-up provide, there is room for more in-depth research to further improve the user-friendliness of the UIs of geoportals. This, for example, involves looking into what communication mechanisms and help mechanisms, icons, terminology, or controls users prefer. Furthermore, additional research into the possibilities of adaptive UIs for geoportals can be valuable to suit possible differences in the needs and preferences of the different individual users.

Geomatics

Land can sometimes be water

Naeema Ali

Land was always associated with value, stability, certainty and utility in contrast to water. Subsequently, early civilizations and modern-day habitations fundamentally removed or controlled water. However, the traditional water systems did this in a more sustainable fashion. Here, water management was a unit of cultural expression of the site-specific challenges faced by people. One such traditional water system is the "Kuttanad Kayalnilam Farming System": a long-established land-water utilization system that practices paddy farming below sea level for more than a century now. Positioned at the mouth of a delta, this agrarian landscape deals with the threat of periodically fluctuating water levels resulting in seasonal flooding which adversely influences the livelihood of the inhabitants. Taking the case of the Kuttanad deltaic landscape, this thesis brings to the foreground, a radical departure from the tenets of classical terrestrial centric approaches for creating a flexible landscape by redefining the relationship between land and water in order to improve the quality of life and space in the delta.

The new fluid geographical approach was based on a systematic understanding of the amphibious qualities embedded in the site context through a four-lens approach. The lenses being volatility, hydro-sociality, rhythm and wetness, and reflect respectively: radical emergence of lives and landscapes, the mutual implications of social life and water flows, the pulsating temporality in hydro-social relations and the materialization of water in everyday life (Krause, 2017). Together these lenses led to a site-specific spatial framework for enhancing the amphibious value of landscapes. In the case of Kuttanad, this called for a revival of the indigenous relationship between land and water which can be accomplished by moderately restoring the cyclical movement of salt and water. This radical change is envisioned over a large time frame by means of slow landscape architecture. Furthermore, an adaptive design calendar or water calendar was formulated to guide this slow landscape transformation. The water calendar is a tool that can be used for decision making regarding the function, quality and diversity of space and life in a flexible landscape operating within the spatio-temporal context of the particular deltaic region. Ultimately, it will guide to gradually build a complex narrative of how humans and nature exchange roles between being makers and takers of the landscape over time. Here, the role of the landscape architect is to facilitate this narrative by envisioning a slow landscape architectonic transformation. On the whole, this is a generic approach that can be applied to any other delta facing similar challenges.

Landscape Architecture

Redefine the border of water

Linyu Qu

In the past centuries, water structures such as canals, etc. were important as a lifeline for a city instead of being a facility only for water. However, globally, cities are turning their back to the water. Despite their potential for urban development, many canals or watercourses are losing their identity in urban areas. Through landscape methods, there are potential to turn the role of water in cities more positive and let it influence life in the urban area.

The Grand Canal in China, start from Hangzhou to Beijing, was a backbone for urban life and played an important role in social, culture, ecology and economy in history. Tongzhou, located in a low-lying area in the southeast corner of Beijing, was in history a hub along the Grand Canal that connected Beijing city center and southern China. Even though the Grand Canal doesn't benefit Beijing as in the past anymore, it is still a strong urban element for creating public space and potential backbone for urban development in Tongzhou district. The Grand Canal can serve as a landscape infrastructure in Tongzhou district, creating spatial conditions for social-ecological inclusive urban development.

There are always roads or a stretch of green in parallel to the canal, which were mostly planned as part of a park or public area. Space was only expanded in parallel to the canal almost in all types of waterfront. Longitudinally, the existing green area next to the canal is a separate system from the city. The accessibility to the public area can be improved in the lateral dimension. Vertically, there is always a boundary in the border of water, it is hard for people to touch the water, which is considered dangerous being close to the water. To transform the Grand Canal as a landscape infrastructure, we need to make use of the expansion area and create a connection between city and water, people and water. Hence, space is going to be considered as a zone instead of a line around the canal and from the upland trail to instream. Moreover, the Grand Canal as one of the most important water source carriers is in charge of keeping water and keep the quality of water. There are moves of water retention and purification to be made in the design process.

This project explores the potentials of the Grand Canal as a backbone for urban development. It is considered to be an urban landscape infrastructure that exploits the longitudinal(amount of water and water connection), lateral(connection between water and city, ecology connection) and vertical(connection between water and people, water and ecology) dimensions and creates conditions for the development of a social-ecological inclusive urban landscape and sustainable water management.
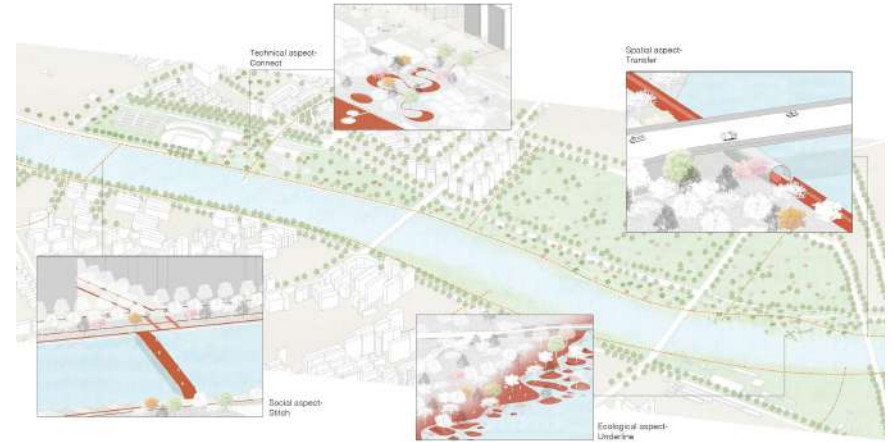
Landscape Architecture

Productive symbiosis
Matthijs Hollanders

In this thesis project, a landscape architectural framework is made for a selected site in Parkstad Limburg. The design proposal for this region serves as a possible outcome of this framework, based on design principles and generic objectives.

Parkstad Limburg used to be a wealthy region due to the thriving mining industry. The closing of these mines meant economic decline and the neglect of this region. To counter these consequences, many initiatives focus on the recovery and improvement of the landscapes' qualities. Nature development for recreational use along the brooks, for instance, has started to greenify the landscape.

The agricultural lands, however, are dealing with more than the landscapes' attractiveness. Soil compaction, erosion, and a poor carbon cycle are under discussion. The large scale agricultural practice also influenced the ecological value of these lands. Small landscape elements have been removed, resulting in shrinking biodiversity.

New agricultural models are developing, such as agroforestry, food forests, and carbon farming. Their currently small scale implementations do not achieve great impact. Agroecology should be practiced on a larger scale to realize its potential benefits for food production, recreational experience, and contribution to biodiversity.

The basic design objective is to enlarge the areas covered with woody plants, such as trees. Especially along the slopes, these reforestations can add value, due to their ability to stabilize the soil and slow down the water run-off. Besides forest coverage, open landscapes are equally important to biodiversity. These open landscapes provide wide views. The allocation of the forested plots should consider the existing valuable views.

For the design of the high and flat plateaus, agroforestry systems are applied, to preserve these views and profit from the flat surface. On these lands, conventional crops can be cultivated. The additions of production forest typologies are placed along the slopes. Food forests are shaped in strips, following the height-lines. This strip-cultivation ensures an easy harvest method. There are also less rationally organized forests which are for wood production. Wood production which supports the development of a sustainable wood industry for high-quality use. Besides tools or furniture, a revolution in wooden architecture is at hand.

The landscape architectural framework searches for the synergy of the ecological processes and the productivity of the landscape. Separation of these systems have caused problems for one another, but working together is beneficial for both. Combining multifunctional use with recreational experiences increases awareness and support for this shift in our cultivated landscapes.
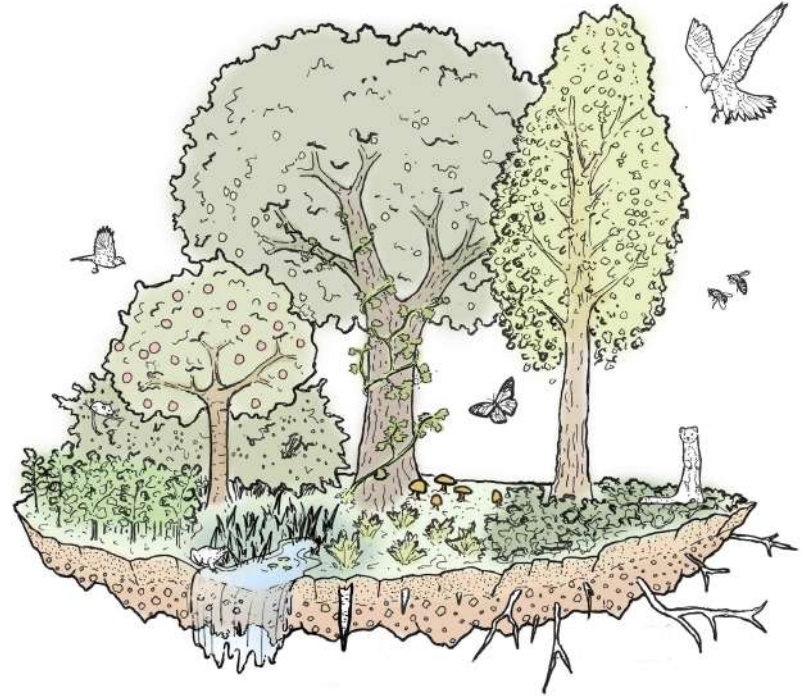
Landscape Architecture

Re-Assembling Semarang City

Widasari Yunida Putri

Semarang City is located in the northern part of Java Island, Indonesia. As an important port city, Semarang's urban fabric is closely related to its infrastructure: water and traffic networks. However, since the 1980s, the acceleration of Semarang urban growth has not been supported by proper foundations. The characteristics of the coastal area were hardly taken into account in urban development. Consequently, flood risk and, in particular, rob phenomena or tidal flood became the chronic problem of Semarang City. In the urban planning documents between 1975 and 2000, issues of tidal flood risk were not considered.

Consequently, the environment degradation and the infrastructure destruction have continued to occur in the Semarang coastal area. Moreover, community life is always threatened by inundation risks. However, the recent spatial planning documents in Semarang City have made considerable progress in addressing coastal disaster risk issues; the number of disaster-related issues discussed in the spatial planning documents of 2010 to 2030 is much higher than those of 2000 to 2010. This condition indicates that urban institutions are increasingly aware of coastal risks as they develop urban risk management policies, including efforts to solve flood risks in Semarang City. Spatial planning in Indonesia should also accommodate efforts for the reduction of urban risk.

The intended outcomes and goals is a vision of an improved environment and resiliency on the community level regarding the water-related issue in Semarang city. A Catalog of Strategies will then be provided based on the design research to the involved stakeholders (local inhabitants) to make better decisions of mitigation planning in the future. This research tries to contribute to the knowledge on the combination of soft and hard approaches in urban planning through spatial and non-spatial strategies, along with the multidisciplinary and multi scalar approach, addressing the spatial issues (water-related) where it balances the formal and informal planning system.

Urbanism
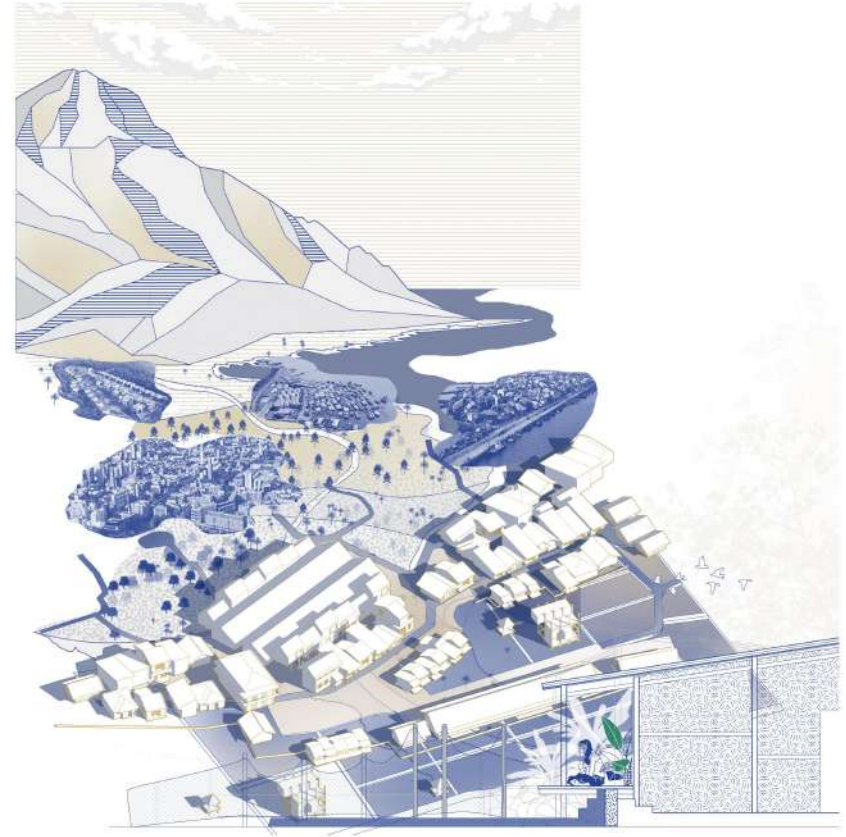
Unsafety
Lieke Marijnissen

This project researched how spatial elements and characteristics influence perceived safety and how these elements and characteristics can be integrated into urban design. The research and design are conducted in the neighborhood Pendrecht, a post-war, modernist neighborhood in the South of Rotterdam. The project has identified the effects of the spatial environment on perceived safety and has validated design principles that aim to improve perceived safety. The final outcome of this thesis is a neighborhood transformation design that integrates the validated design principles in combination with other urban design challenges.

Urbanism
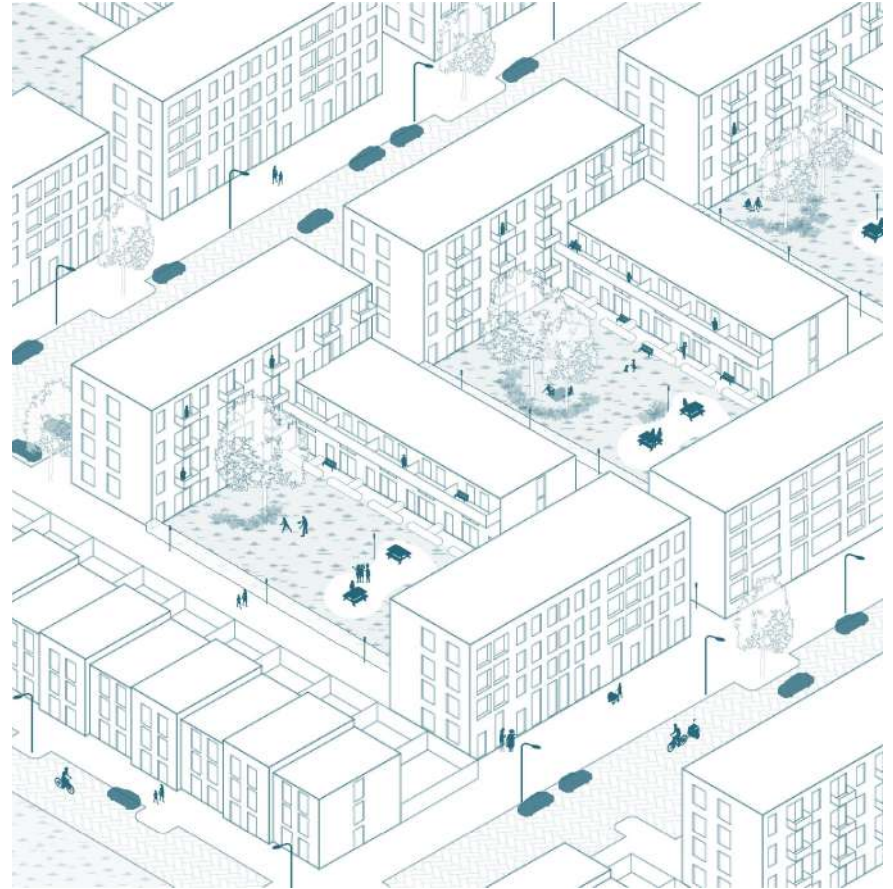
Restoring systemic proximities

Isabel Recubenis Sanchis

Uncertainty posed by Climate Change brings control approaches to environmental processes and dynamics into question. In the Netherlands and particularly in the Dutch River area (Rivierenland in Dutch) narratives have already shifted towards an adaptive planning (Davoudi, 2013). However, there is still a need to go beyond the physical cultural and programmatic separation between rivers -active areas in flood management- and the urbanized territory -passive areas in flood management-. The definition of these dualities in the Dutch territory not only feeds a model based on vulnerability, but it also leaves the problem of a fragmented landscape unsolved. Aiming at the enhancement of adaptive territories and the embracement of uncertainty, the thesis proposes the operationalization of an approach based on enhanced connectivity throughout the territory, where every part of the urbanized territory takes a role in the active management of floods and ecosystem restoration. An approach aiming at restoring systemic proximities between culture and nature and between local land management and territorial water safety.

The main design outcome of the thesis is a transformation pathway towards the hybridization of the territory by increasing ecological densities and buffer capacities per land management unit. A pathway where synergistic coupling of functions are activated locally, triggering processes of innovation and cultural appropriation of the proposal, as opportunities for emerging ecosystem-based production models.

The graduation research is positioned within an emerging urban paradigm, one that re-defines the act of urbanization as an act of re-territorialization (Deleuze and Guatari, 2000), where land uses are associated to evolutionary land roles that different occupation patterns perform in the establishment of a more symbiotic relation with the ecology in which these are embedded.

Sources: Davoudi, S., Brooks, E., & Mehmood, A. (2013). Evolutionary resilience and strategies for climate adaptation. Planning Practice & Research, 28(3), 307-322. Guattari, F., & Deleuze, G. (2000). A thousand plateaus: capitalism and schizophrenia. London: Athlone Press.

Urbanism

Height Inference for all USA Building Footprints in the Absence of Height Data

Imke Lánský

In recent years, the demand for 3D spatial information and 3D city models has increased, as they support and allow many different applications, e.g. noise simulations, energy demand estimations, and shadow analysis. Constructing a city model with 3D buildings requires elevation data (such as LiDAR or Digital Terrain Models), but unfortunately, data of sufficient quality is often unavailable. This thesis focuses on the use of machine learning methods to estimate the height of building footprints and thus bypassing the use of elevation data completely. Three different methods are tested and compared: Random Forest Regression (RFR), Multiple Linear Regression (MLR), and Support Vector Regression (SVR).

A case study is performed for the conterminous United States of America (USA) because of its availability of a nation-wide building dataset, containing roughly 125 million building footprints. The high diversity in urban layouts is considered, where a distinction is made between Central Business Districts (CBDs) in cities and all other regions (e.g. suburbs and rural areas). All building footprints are characterised by nine features derived from their geometry, which are then used (in several combinations) in the model training and predicting stages. Furthermore, the influence of additional features --- including census and cadastral data --- on the results of the building height predictions is analysed for the city of Denver, Colorado.

The experiments show that it is feasible to predict the height for all buildings in the conterminous USA in under 6 minutes. Both the MLR and SVR method even accomplish it in under 30 seconds. The height prediction results show that the different prediction models struggle to accurately estimate the height for buildings in CBDs. The lowest achieved Mean Absolute Error (MAE) is 31.81m, whereas for the suburban and rural areas it is 1.41m. Adding additional, non-geometric features (e.g. census data) to the prediction models for one city (Denver) proved to be successful; the RFR method reduced its MAE from 1.35m to 0.96m for the suburbs, achieving sub-metre accuracy. The CBDs, however, are still problematic with an MAE of 16.87m.

These results show that for the suburban and rural areas, the accuracy recommendations from the CityGML specifications for LOD1 models can be met (5m limit). For the CBDs, improvement is required. The experiments also proved that the proposed methodology can be used to generate 3D city models of very large datasets if no elevation data is available. Moreover, the method is, in theory, generic enough to be applied outside the USA.

Geomatics