technische universität
dortmund

Project market

22th April 2020
study performance of modules 2 and 3 (B.Sc. 2019)

rp°

Fakultät Raumplanung
Dekanat | Studien- und Projektzentrum

Content

Contact

Dekant | Studien- und Projektzentrum
Fakultät Raumplanung

GB III R. 207
August-Schmidt-Str. 10
44147 Dortmund

E-Mail: spz.rp@tu-dortmund.de

Layout: Sophie-Marie Weidig, Dekanat

F-Projects

Abstract F02

Focus on the False Creek Flats: Adaptation, Innovation, Processes of Transformation on Industrial Lands in Vancouver, BC

It is no secret that our world is evolving quickly, which has a strong impact on our everyday life. How we work, move, consume – simply live within a city is heavily dependent on its built nature. Thus, one of the current questions in urban planning is ‚How can we build cities that meet not only our but also the future generations' needs?' This question takes up the main theme of the UN's universally accepted definition of sustainability and sustainable development of 1987's Brundtland report.

In the context of making our cities as sustainable as possible, urban industrial areas in particular must be taken into account. Due to the increasing demand for housing units and the increasing value of lands, some cities decide to give up urban industrial areas and move them to the periphery, although these sites often contribute an essential share of the local food and goods production as well as jobs near housing areas.

The City of Vancouver decided for the protection of existing industrial lands and is currently developing an urban industrial area known as the False Creek Flats as part of the ambitious goal of becoming one of the greenest cities in the world. The City, said to be one of the most livable cities world-wide, is also known to be one of the most expensive cities to live in, adding economic difficulties to its determined aim.

Our project F02: Focus on the False Creek Flats Adaptation, Innovation and Processes of Transformation on Industrial Lands in Vancouver, BC is looking at sustainability of urban design guidelines developed for False Creek Flats and relevant effects that the restructuring of the area could have on the city from an external and international perspective. On the one hand, we are asking how sustainability was being prioritized in the participation process of the False Creek Flats' development. On the other hand, we also want to find out how the international scale of sustainability is taken into account in said development with help of selected Sustainable Development Goals, developed by the UN in 2015 and adopted by all member states including Canada in the same year. Both questions will be approached by analyzing the plans, policies and guidelines created by the City of Vancouver within the scope of False Creek Flats' development as well as scientific literature, stakeholder analyses and interview methods. Those methods will enable the identification and understanding of prioritized interests and influence reflected within the City's planning policy and by local people.

To deepen our knowledge about the locals' engagement with the current situation and future plans and to collaborate with local professionals, our project visited Vancouver in February and March 2020. The time spent on site in the research context provided opportunities to conduct our fieldwork and also engage with realities and experiences outside the classroom walls. The research results are intended to provide insight into sustainability in urban agglomerations, such as the Ruhr Metropolitan Area, which also faces comparable challenges to develop sustainability.

F02: Focus on the False Creek Flats -

Adaptation, Innovation and Processes of Transformation on Industrial Lands in Vancouver, BC

Research Motivation
- Significant value of inner-city industrial lands
- Vancouver is known for its distinctive urban form of Vancouverism
- Sustainability is important in times of climate change
- Planner look at other places to gain experience and inspiration

The False Creek Flats

The False Creek Flats is an industrial site in Vancouver, BC. The Flats cover about 450 acres and are located next to Vancouver's downtown core. It is home to over 600 businesses including industrial, institutional and office uses with a total workforce of roughly 8,000 (1). The area is well-served by rapid transit including rail, roads and ferries. The city realized the potential of the Flats and wants to develop the False Creek Flats into a place of innovation, entrepreneurship and creativity.

Sustainability

Countries and cultures understand sustainability differently. Therefore, a universal definition for sustainability does not exist.

- Germany: *Nachhaltigkeit* (durability)
- Finland: *säästäväisyys* (frugality)
- Denmark: *hygge* (sociability of space)

In 1987, the United Nations came up with a broadly accepted definition. Sustainable development should "meet the needs of the present without compromising the ability of future generations to meet their own needs" (2). The most recent agreement adopted by all UN member states in 2015 are 17 *Sustainable Development Goals* which aim for "peace and prosperity for people and the planet, now and into the future" (3). They serve as a normative framework for cities in achieving sustainability and as a solid base for measuring sustainability (4).

Methodology

1. What role did sustainability play during the participation process?
2. To what extent are the SDGs by the United Nations being implemented in the False Creek Flats?

We organized a ***learning exchange*** with students from Simon-Fraser University. First results of our collaborative research on the False Creek Flats have been presented to the head of the Flat's planning in Vancouver already.

During our excursion, we ***interviewed*** different local experts. We had the chance to talk to the head of the Flats' planning, the Vancouver Economic Commission and several heritage experts. Those conversations gave us insight into challenges Vancouver is facing as well as into how the FCF-plan addresses the current needs of the city.

We also decided to do a ***GIS green space mapping*** to ascertain, if our investigation areas are lacking in green space which was an impression we had during our excursion. Furthermore, we will do a ***GIS-distance-mapping*** to look at the distance from our sites to the next public transport facilities.

To find out how sustainability is prioritized in the participation process, ***coding*** the huge number of documents we gained through interviews and research on topics such as sustainability, Vancouver and the planning process, is an essential method for our work.

technische universität dortmund

The 5 case study areas

In 2011, Metro Vancouver's Regional Growth Strategy identified the False Creek Flats as a significant industrial area and set the stage for the subsequent development of definite plans for the area (5). Because of the Flats size, we decided on choosing five spatial areas to represent the False Creek Flats' spatial and built diversity.

Heritage Buildings...
built in 1923/24, they represent the industrial past and historic role of neon production in the Flats.

Innovation Hub...
a city-owned property, is ought to represent the Flats' innovation and economic diversity through a broad spectrum of uses.

VCC-Clark-Station...
is a station for two SkyTrain lines, it plays a connecting role between downtown Vancouver and the adjacent cities.

Walk-the-Line...
is a pedestrian- and cycle-friendly network for public, ecological and institutional anchors in the investigation area.

Emily Carr University...
of Art + Design (ECUAD) is located in the south of False Creek Flats. Today, it counts about 1,900 students (6).

Abstract & Bibliography

References
(1) City of Vancouver, 2015
(2) Brundtland report, 1987
(3) United Nations, 2015
(4) Knellenberg et al., 2019 und Singh et al., 2018
(5) Greater Vancouver Regional District, 2017
(6) Emily Carr University, 2020
(7) City of Vancouver, 2017a
(8) City of Vancouver, 2017b
(9) BC Tech Association, 2020

Our Research Results

- Most of the False-Creek-Flats Area Plan from 2017 is not implemented yet.
- Currently, the Flats lack valuable public spaces.

Innovation
- Through rezoning the emerging economy should be supported. Probably the biggest challenge the city faces is the affordability of housing. Therefore, the plans for *the Innovation Hub* have changed. Now, housing and retail is planned to react to the high demand for residential units.
- Although *the Heritage Buildings* are on the official Heritage Register, they are not protected from demolition. Currently, the City is working on the Heritage Action Plan that uses the UNESCO's Historic Urban Landscape approach. The Flats have different stories to tell: Before the area was used by colonists for industrial purposes, it was a First Nations' ground.

Mobility
- Soon, *VCC-Clark Station* will be part of the Broadway Subway Project which will add an extension of 5 km and 6 new stations to the transport system. In addition to that, the surrounding area will be upgraded by a new high-rise building and innovations in the False Creek Flats.
- *Walk-the-Line* is still in its conceptual phase. The False Creek Flats are fragmented by the Terminal Spine, making it impossible to establish paths across the rails from north to south. Discussions with the railway authority have not reached a conclusion yet.

Education
- It is possible to reach the ECUAD via public transport and bike. The ECUAD provides access to people with special needs. There are few elements outside, which remind of the area's industrial past or indigenous culture. The campus is predominantly sealed and clean, offering only (very) few green elements and sitting accommodations.

Authors and Contact
Supervisor: M.Sc. Robin Chang | Advisor: Dipl.-Ing. Jan Bunse | Students: Maie Bertram, Constantin Diete, Lisa Ramesh, Viola Ricksgers, Lara Vogel, Patrick Voss
innovation-industriallands.rp@tu-dortmund.de

Abstract F04

Psychoacoustics of the Urban Landscape

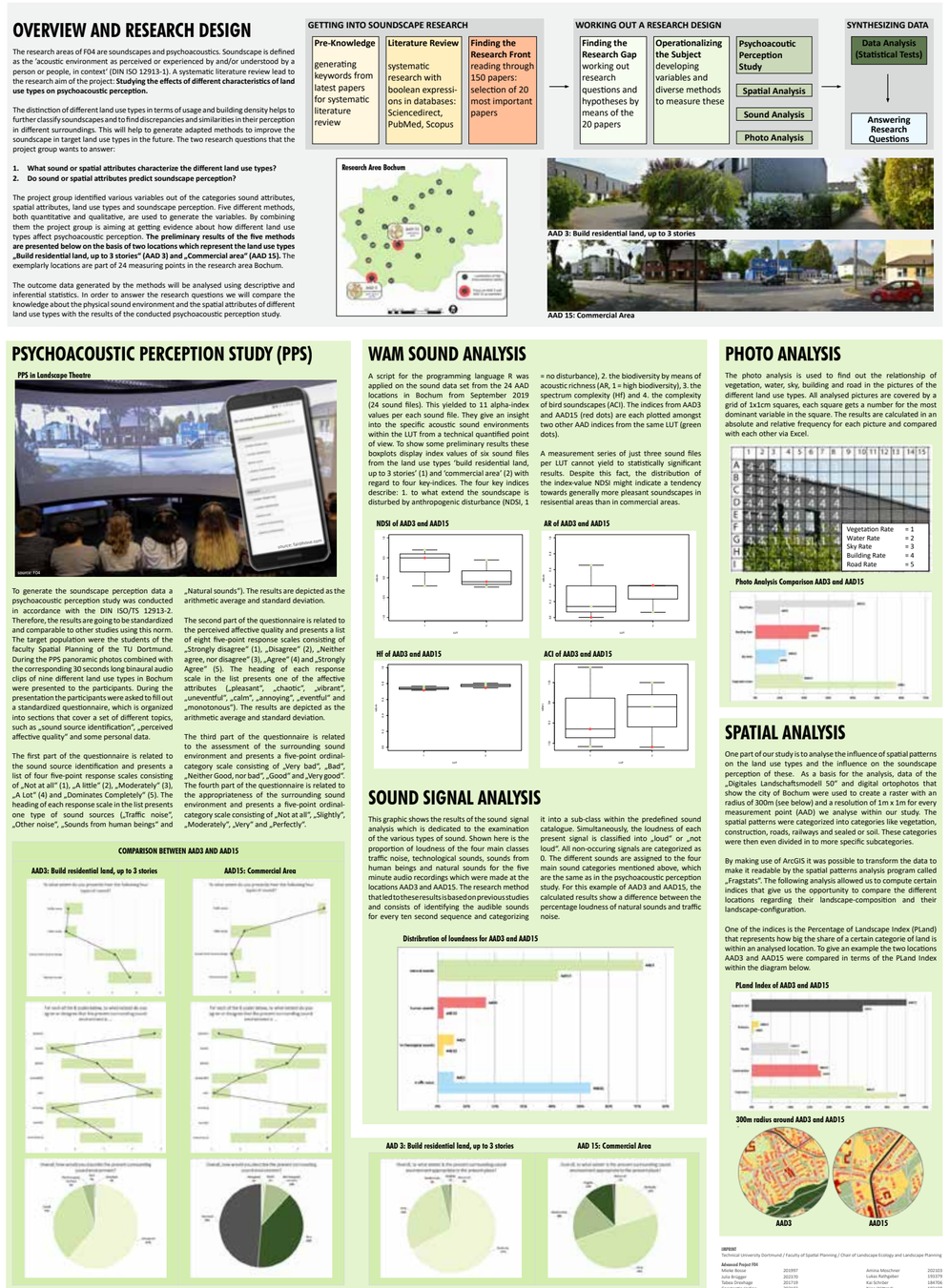
Have you ever thought about the way you perceive sounds of your surroundings in everyday life? Which sounds do you perceive as pleasant and which ones bother you? Questions like these introduced the project group to the research area of psychoacoustics and soundscapes. The DIN ISO 12913-1 defines a soundscape as the 'acoustic environment as perceived or experienced by and / or understood by a person or people, in context'. The project is embedded in the pilot study 'Acoustic Quality and Health in Urban Environments (SALVE)' which aims at understanding the impact of acoustic quality on urban public health by looking beyond noise protection and focusing on the positive impacts of sound for health.

Based on the definition of the DIN ISO 12913-1, the project group carried out a systematical literature review in order to get an overview of the current state of research. The review showed that existing psychoacoustic studies often deal with sound perception in one particular surrounding, e.g. in urban parks or public squares. But little is known about the differences in soundscape perception between various urban land use types. This led to the research aim of the project: Studying the effects of dif-ferent land use types on psychoacoustic perception. The distinction of different land use types in terms of usage and building density helps to further classify soundscapes and to find discrepancies and similarities within their perception in different surroundings. This will help to generate adapted methods to improve the soundscapes in target land use types in the future.

The project group wants to answer two research questions: What sound or spatial attributes characterize the different land use types? And, in a second step, do sound or spatial attributes predict soundscape perception? In order to answer the questions, the project group identified various variables out of the categories sound attributes, spatial attributes, land use types, and soundscape perception. Five different methods, both quantitative and qualitative, are used to generate the variables. By combining them the project group is aiming at getting evidence about how different land use types affect psychoacoustic perception. The quantitative part consists of the analysis of the sound attributes and spatial attributes with the help of various programs like R-Studio, ArcGIS and Photoshop. In order to generate sound perception data a qualitative psychoacoustic perception study (PPS) has already been designed and carried out.

During this laboratory experiment panoramic photos combined with the corresponding 30 seconds long binaural audio clips of nine different land use types in Bochum were presented to the participants. The image and sound data were collected within the SALVE project in advance. During the presentation the participants were asked to fill out a standardized questionnaire which was designed in accordance with the DIN ISO/TS 12913-2. The target population were students of the faculty Spatial Planning of the TU Dortmund. A sample of 309 participants ensures representative assertions about the psychoacoustic perception of the students.

The numeric outcome data will be synthesized by using descriptive and inferential statistics. The project group will compare the findings about the physical sound environment and the spatial attributes of different land use types with the results of the conducted psychoacoustic perception study.



Abstract F06

Smart Resilience Hai Phong – Increasing Climate Resilience with Smart City Solutions based on Remote Sensing and GIS Analyses

In the light of an increasing frequency and intensity of extreme weather events, urban areas need to establish strategies to deal with these shocks. Especially the growing population of coastal cities like Hai Phong in Northern Vietnam is exposed to heavy rainfall and severe storms as well as the rising sea-level. Resilience has become a prominent strategy as it is a multi-faceted approach to deal with external shocks. In the context of this study, Resilience is understood as a transformative ongoing process to build the ability to react flexibly to unforeseen challenges and to reduce unintended effects that aggravate climatic stresses. When building resilience, it is important to achieve an equitable distribution of risks and resources. Alongside the concept of Resilience, Smart City Strategies have been implemented in many cities to improve the standard of living and the efficiency of the system's processes by utilising information and communication infrastructure. This study will explore the benefits of combining the two concepts, focusing on the dimensions of infrastructure, environment and society of the urban system. The research process is structured along the three following research questions:

"Which methods, data and indicators are appropriate to measure resilience

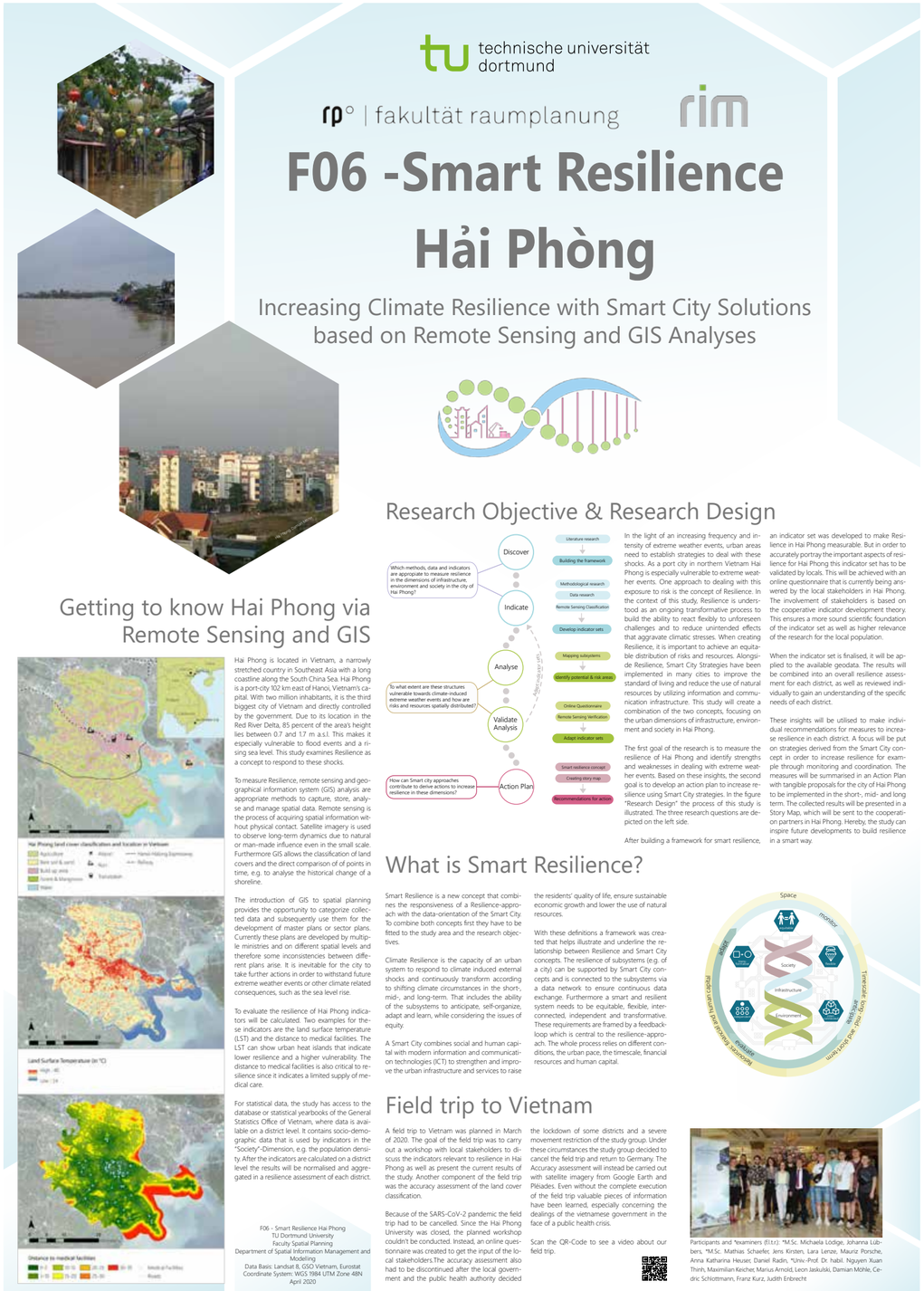
in the dimensions of infrastructure, environment and society in the city of Hai Phong?"

"To what extent are these structures vulnerable towards climate-induced extreme weather events and how are risks and resources spatially distributed?"

"How can smart city approaches contribute to derive actions to increase resilience in these dimensions?"

These questions translate into two main goals. The first goal is to measure the resilience of Hai Phong and identify strengths and weaknesses in dealing with extreme weather events. Based on these insights, the second goal is to develop an action plan to increase resilience using Smart City strategies.

Land cover analyses play a central role in assessing the resilience of Hai Phong. With the tool of remote sensing the study group created land cover maps for the years 1987, 2003 and 2019 based on Landsat satellite imagery. As an established tool to assess and monitor resilience an indicator set was compiled. Based on a conceptual framework that combines the two concepts of Resilience and Smart City, indicators suitable to measure the resilience of Hai Phong were gathered from literature for each of the dimensions. The indicators should be able to be applied on a district level and calculated with geodata. To gain a first impression of the conditions in Hai Phong and to test the applicability of certain indicators a selected number were already put into practice. These analyses are already pointing towards vulnerable areas and insufficiencies to be explored further. Since the indicator set is solely based on literature and ideas about the city gathered from a distance, it needs to be discussed with people of local expertise to ensure the indicators are relevant for the study area. To this end, the group organised a workshop with students in Hai Phong. However, due to the spread of SARS-CoV-2 the workshop had to be cancelled. Consequently, the group transformed the contents of the workshop into an online-questionnaire. The survey was sent to the local partners, so they can still add important indicators and give their feedback to the existing ones. Additionally, an accuracy assessment for the 2019 land cover map needed to be conducted remotely as well. The generated ground truth point should have been checked for the actual land cover first-hand during the field work in Hai Phong. Instead of relying on site visits the study group used additional satellite images with a high geometric resolution as reference. The determined accuracy confirmed that the land cover map depicts reality to a degree qualified for further work. When the indicator set is finalised with the results of the questionnaire analysis, it will be applied to the available geodata. The results will be normalised and combined into an overall resilience assessment for each district, as well as reviewed individually to gain an understanding of the specific needs of each district. These insights will be utilised to make individual recommendations for measures to increase resilience in each district. A focus will be put on strategies derived from the Smart City concept, that can increase resilience for example through monitoring and coordination. The measures will be summarised in an Action Plan with tangible proposals for the city of Hai Phong to be implemented in the short-, midand long term. The collected results will be presented in a Story Map, which will be sent to the partners in Hai Phong. Hereby, the study can inspire future developments to build resilience in a smart way.



In the light of an increasing frequency and intensity of extreme weather events, urban areas need to establish strategies to deal with these shocks. As a port city in northern Vietnam Hai Phong is especially vulnerable to extreme weather events. One approach to dealing with this exposure to risk is the concept of Resilience. In the context of this study, Resilience is understood as an ongoing transformative process to build the ability to react flexibly to unforeseen challenges and to reduce unintended effects that aggravate climatic stresses. When creating Resilience, it is important to achieve an equitable distribution of risks and resources. Alongside Resilience, Smart City Strategies have been implemented in many cities to improve the standard of living and reduce the use of natural resources by utilizing information and communication infrastructure. This study will create a combination of the two concepts, focusing on the urban dimensions of infrastructure, environment and society in Hai Phong.

The first goal of the research is to measure the resilience of Hai Phong and identify strengths and weaknesses in dealing with extreme weather events. Based on these insights, the second goal is to develop an action plan to increase resilience using Smart City strategies. In the figure "Research Design" the process of this study is illustrated. The three research questions are depicted on the left side.

After building a framework for smart resilience, an indicator set was developed to make Resilience in Hai Phong measurable. But in order to accurately portray the important aspects of resilience for Hai Phong this indicator set has to be validated by locals. This will be achieved with an online questionnaire that is currently being answered by the local stakeholders in Hai Phong. The involvement of stakeholders is based on the cooperative indicator development theory. This ensures a more sound scientific foundation of the indicator set as well as higher relevance of the research for the local population.

When the indicator set is finalised, it will be applied to the available geodata. The results will be combined into an overall resilience assessment for each district, as well as reviewed individually to gain an understanding of the specific needs of each district.

These insights will be utilised to make individual recommendations for measures to increase resilience in each district. A focus will be put on strategies derived from the Smart City concept in order to increase resilience for example through monitoring and coordination. The measures will be summarised in an Action Plan with tangible proposals for the city of Hai Phong to be implemented in the short-, mid- and long term. The collected results will be presented in a Story Map, which will be sent to the cooperation partners in Hai Phong. Hereby, the study can inspire future developments to build resilience in a smart way.

Hai Phong is located in Vietnam, a narrowly stretched country in Southeast Asia with a long coastline along the South China Sea. Hai Phong is a port-city 102 km east of Hanoi, Vietnam's capital. With two million inhabitants, it is the third biggest city of Vietnam and directly controlled by the government. Due to its location in the Red River Delta, 85 percent of the area's height lies between 0.7 and 1.7 m a.s.l. This makes it especially vulnerable to flood events and a rising sea level. This study examines Resilience as a concept to respond to these shocks.

To measure Resilience, remote sensing and geographical information system (GIS) analysis are appropriate methods to capture, store, analyse and manage spatial data. Remote sensing is the process of acquiring spatial information without physical contact. Satellite imagery is used to observe long-term dynamics due to natural or man-made influence even in the small scale. Furthermore GIS allows the classification of land covers and the direct comparison of of points in time, e.g. to analyse the historical change of a shoreline.

The introduction of GIS to spatial planning provides the opportunity to categorize collected data and subsequently use them for the development of master plans or sector plans. Currently these plans are developed by multiple ministries and on different spatial levels and therefore some inconsistencies between different plans arise. It is inevitable for the city to take further actions in order to withstand future extreme weather events or other climate related consequences, such as the sea level rise.

To evaluate the resilience of Hai Phong indicators will be calculated. Two examples for these indicators are the land surface temperature (LST) and the distance to medical facilities. The LST can show urban heat islands that indicate lower resilience and a higher vulnerability. The distance to medical facilities is also critical to resilience since it indicates a limited supply of medical care.

For statistical data, the study has access to the database or statistical yearbooks of the General Statistics Office of Vietnam, where data is available on a district level. It contains socio-demographic data that is used by indicators in the "Society"-Dimension, e.g. the population density. After the indicators are calculated on a district level the results will be normalised and aggregated in a resilience assessment of each district.

F06 - Smart Resilience Hai Phong
TU Dortmund University
Faculty Spatial Planning
Department of Spatial Information Management and Modelling

Data Basis: Landsat 8, GSO Vietnam, Eurostat
Coordinate System: WGS 1984 UTM Zone 48N
April 2020

What is Smart Resilience?

Smart Resilience is a new concept that combines the responsiveness of a Resilience-approach with the data-orientation of the Smart City. To combine both concepts first they have to be fitted to the study area and the research objectives.

Climate Resilience is the capacity of an urban system to respond to climate induced external shocks and continuously transform according to shifting climate circumstances in the short-, mid-, and long-term. That includes the ability of the subsystems to anticipate, self-organize, adapt and learn, while considering the issues of equity.

A Smart City combines social and human capital with modern information and communication technologies (ICT) to strengthen and improve the urban infrastructure and services to raise the residents' quality of life, ensure sustainable economic growth and lower the use of natural resources.

With these definitions a framework was created that helps illustrate and underline the relationship between Resilience and Smart City concepts. The resilience of subsystems (e.g. of a city) can be supported by Smart City concepts and is connected to the subsystems via a data network to ensure continuous data exchange. Furthermore a smart and resilient system needs to be equitable, flexible, interconnected, independent and transformative. These requirements are framed by a feedback-loop which is central to the resilience-approach. The whole process relies on different conditions, the urban pace, the timescale, financial resources and human capital.

Field trip to Vietnam

A field trip to Vietnam was planned in March of 2020. The goal of the field trip was to carry out a workshop with local stakeholders to discuss the indicators relevant to resilience in Hai Phong as well as present the current results of the study. Another component of the field trip was the accuracy assessment of the land cover classification.

Because of the SARS-CoV-2 pandemic the field trip had to be cancelled. Since the Hai Phong University was closed, the planned workshop couldn't be conducted. Instead, an online questionnaire was created to get the input of the local stakeholders.The accuracy assessment also had to be discontinued after the local government and the public health authority decided the lockdown of some districts and a severe movement restriction of the study group. Under these circumstances the study group decided to cancel the field trip and return to Germany. The Accuracy assessment will instead be carried out with satellite imagery from Google Earth and Pléiades. Even without the complete execution of the field trip valuable pieces of information have been learned, especially concerning the dealings of the vietnamese government in the face of a public health crisis.

Scan the QR-Code to see a video about our field trip.

Participants and Yexaminers (l.t.r.): *M.Sc. Michaela Lödige, Johanna Lubbers, *M.Sc. Mathias Schaefer, Jens Kirsten, Lara Lenze, Mauriz Porsche, Anna Katharina Heuser, Daniel Radni, *Univ.-Prof. Dr. habil. Nguyen Xuan Thinh, Maximilian Kircher, Marius Arnold, Leon Jaskulski, Damian Möhle, Cedric Schlottmann, Franz Kurz, Judith Enbrecht