


Study projects of the Faculty of Spatial Planning in English

Studying the influence of sound, spatial and visual attributes on the psychoacoustic perception of urban environments within different land uses.

Project F04
Final Report



Supervisor:
Dr. Ingrid Lammert

Advisor:
M.Sc. Jutta Pappert

July 2020
Faculty of Spatial Planning
TU Dortmund



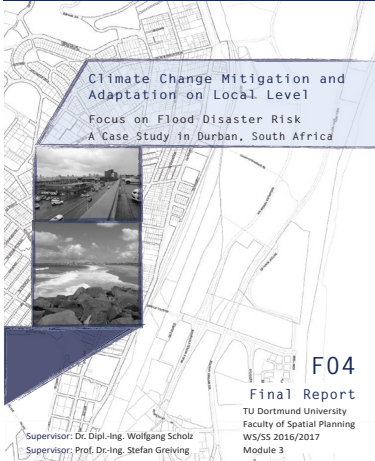
WATER-SENSITIVE URBAN DESIGN IN FAST-GROWING CITIES
Contribution to a sustainable quality of life, building resilience and adaptation to climate change using the examples of Berlin and San Francisco

Supervised by:
Dr.-Ing. Matthias Kolber
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F09

tu technische universität dortmund **rp^c**

Climate Change Mitigation and Adaptation on Local Level
Focus on Flood-Disaster Risk
A Case Study in Durban, South Africa



F04
Final Report
TU Dortmund University
Faculty of Spatial Planning
WS/SS 2016/2017
Module 3

Supervisor: Dr. Dipl.-Ing. Wolfgang Scholz
Supervisor: Prof. Dr.-Ing. Stefan Greiving

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F01 – Resilient Cities: Risks, Repercussions and Realities for Resilience Planning in Metro Vancouver

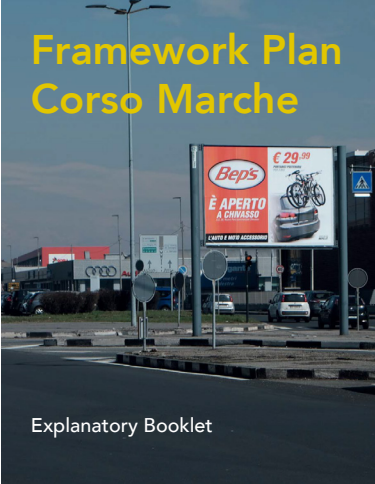
F01 Final Report 07/07/2017, Spring
Supervisor: M.Sc. Robin Chung
Advisor: Dipl.-Ing. Nadine Heidefuss
Department of European Planning Cultures
Faculty of Spatial Planning
Faculty of Spatial Planning
TU Dortmund University

F07



sustainable watermanagement and water sensitive urban design in Muscat/Oman

**Framework Plan
Corso Marche**



Explanatory Booklet

F05 **Final report**

Urban green
more than a design element for the challenges of the future city

Supervisor: Hanna Schmidt | Advisor: Carina Tamaschus
Technische Universität Dortmund | Fakultät Raumplanung | 1. Juni 2017

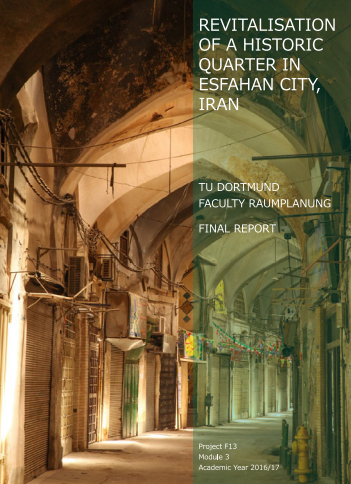


REVITALISATION OF A HISTORIC QUARTER IN ESFAHAN CITY, IRAN

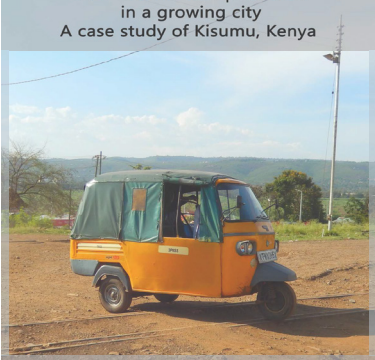

TU DORTMUND
FACULTY RAUMPLANUNG
FINAL REPORT

Project F13
Module 3
Academic Year 2016/17

Supervisor: Dr.Eng. Mehdi Vazfedoost
Advisor: Dr.Eng. Baharsh Heydari



F12 - Public transportation in a growing city
A case study of Kisumu, Kenya

TU Dortmund
School of Spatial Planning

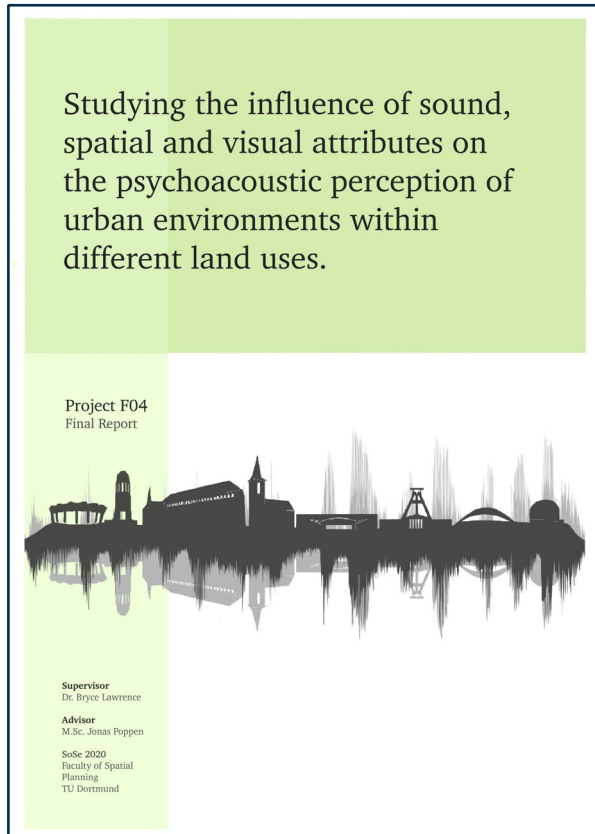
Supervisor:
Dipl.-Ing. Alexander Raabert

Final Report
September 2017

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Studying the influence of sound, spatial and visual attributes on the psychoacoustic perception of urban environments within different land uses



Due to the increasing growth of cities and urbanized areas and an expected future growth trend of urban areas (United Nations 2019), the human perception of the urban acoustic environment becomes an important aspect in spatial planning. The urban acoustic environment is already protected against noise under German law (§§47a-47f BImSchG), but under the noise threshold little guidance for the expected quality of the acoustic environment in urban areas exists. In order to consider the acoustic environment under the noise threshold when planning urban areas, we suggest that it is essential to understand human perception of the acoustic environment. The acoustic environment as perceived by humans in context, typically called the 'soundscape' (DIN ISO 12913-1, p. 7) or psychoacoustic perception (Farina 2014), is a rapidly developing field in which human perception for the wide range of urban environments where humans live remains not entirely understood (Kang et al. 2016, p. 284). Further knowledge about perception of acoustic environments in a range of different urban land use types that include human living quarters would help to clarify any differences in perception of urban acoustic environments and aid in desirable planning or design outcomes.

Considering that acoustic environments vary based at least on traffic noise (Gjestland 2020, p. 1) or quietness (Shepherd et al. 2013, p. 1295) it is reasonable to conclude that soundscape perception would also vary based on land use type. Therefore, the aim of this study is to investigate the influence of sound, spatial and visual attributes on the soundscape perception of urban acoustic environments within different land uses.

The study presents a laboratory experiment in which university student's perception (N=309) of nine different urban land uses was measured according to the soundscape protocol (DIN ISO/TS 12913-2). Resulting perception is compared to independent measures of acoustic, spatial and visual attributes of the sampled urban land uses. Results indicate that acoustic, spatial and visual indices related to the percentage of natural or vegetated area, the presence of natural (biophonic) and traffic sounds, and the presence of vegetation in the visual environment have significant correlations with soundscape perception and may be useful as proxy data to soundscape preference or dislike.

Informationen about the Project

Project F04 | Academic year 2019/2020

Supervisor: Dr. Bryce Lawrence, Advisor: M. Sc. Jonas Poppen

Water-sensitive urban design in fast growing cities - Contribution to a sustainable quality of life, building resilience and adaptation to climate change using the examples of Berlin and San Francisco



In times of climate change, phenomenon's like sea level rise and the increasing occurrence of extreme weather events like heavy rainfall threaten to cause urban floodings in cities around the world. Urban floodings are particularly common in cities that feature a combined sewer system that collects wastewater as well as stormwater and therefore holds the risk to overflow in case of heavy rainfalls. Furthermore, fast-growing cities as for instance Berlin and San Francisco are especially vulnerable to this threat because of their high proportion of sealed surfaces that leads to a high surface runoff of stormwater into the sewer system and therefore a high flooding risk.

Water Sensitive Urban Design (WSUD) aims to maintain and restore a near natural water cycle within cities by managing stormwater through infiltration and evaporation with the help of measures that are designed to create multiple benefits. This means that WSUD measures do not just offer the necessary functionality to reduce the induction of stormwater into the sewer system, but also an aesthetic benefit and an additional usability of the measures for the public.

Against this background the research question "How can the water-sensitive conversion of infrastructures in fast-growing cities contribute to the quality of life regarding extreme weather events and increasing sealing of surfaces?" is drawn up.

To meet the research goal, the aim is to produce WSUD designs, in suitable locations within the examination areas, that can be transferred to as many other cities as possible. As a first step, site visits in the examination areas in Berlin and San Francisco are carried out, within the scope of excursions to both cities, to gain data on surface textures and slopes. Amongst others, this data is used to create stormwater management maps that determine which stormwater management measures are possible in which part of the examination areas. Collected data like the location of downspouts, drains and sensitive infrastructures is used to produce a disconnecting potential map that determines on which examined parcels the most sealed surfaces and roofs can be disconnected from the sewer system and therefore where measures are most effective to counteract urban floodings. To consider flood protection in more detail, flood simulations as well as flow path analysis are carried out to finalise the search for suitable locations for WSUD designs. Additionally, a citizen survey is conducted in Berlin to find out which places the residents of the examination area visit on a regular basis and for which locations they see need for action in terms of enhancements. To gain additional information about the planning process of water sensitive measures and its challenges in San Francisco and to find out what the potential benefits of these measures for the quality of life of the residents of San Francisco are in the eyes of stakeholders involved in the planning process, expert interviews are carried out with stakeholders in San Francisco.

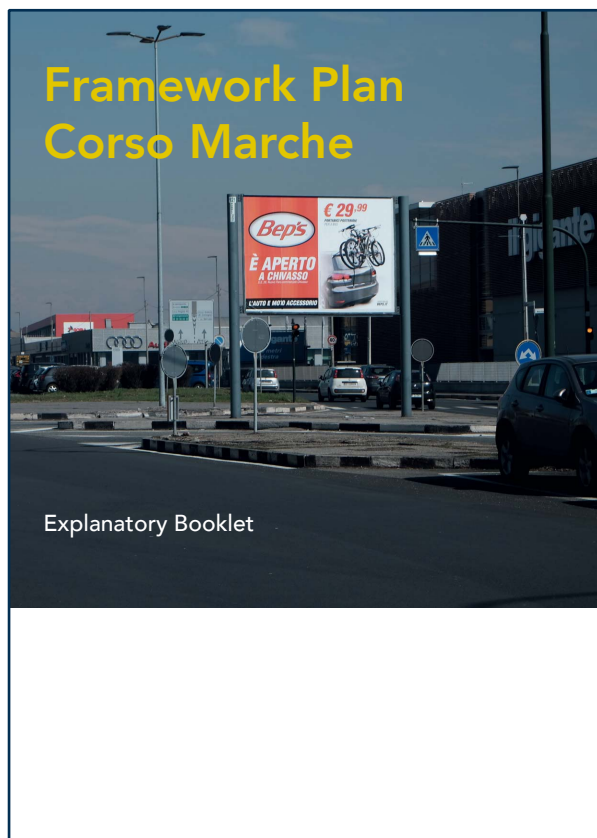
On this basis, seven WSUD designs are created for the examination area in Berlin and three for San Francisco. Each design includes a stormwater management concept that aims to improve the quality of life of the residents of the area as well as relevant swale and cost calculations that include the amortization period of each design. These designs show exemplary how the water-sensitive conversion of infrastructures in fast-growing cities can contribute to the quality of life regarding extreme weather events and increasing sealing of surfaces. In addition, a guide of action that can be used in various fast-growing cities for the planning process of WSUD measures is worked out to make the results of the research useable.

Informationen about the Pproject

Project F09 | Academic year 2018/2019

Supervisor: Dr.-Ing. Mathias Kaiser, Dipl.-Ing. Matthias Pallasch, Dr. rer. pol. Teresa Sprague;

Transforming a Polycentric Metropolitan area - Strategic Planning in Turin, Italy



F04's research focuses on the development of the Corso Marche Axis in the western part of Turin, Italy, and its neighbouring municipalities as well as the role of polycentric stakeholders in strategic planning. The Corso Marche Axis is one of three main infrastructure axes proposed by the public planning document "Piano Regolatore Generale (PRG)" in 1995. Out of this three axes, the Corso Marche remains the only one yet to be completed. Originally, the intention was to combine urban regeneration with new infrastructure projects, to foster the transformation of Turin to a post-industrial city and to create a new backbone of the whole Metropolitan Area. Following the research question "How can the impacts and demands of polycentric networks be harmonised with the basic needs of a local area", the planning studio strives to analyse how polycentric stakeholders influence the development of the Corso Marche Area and in which way the needs of the local citizens can be respectfully considered in this planning process.

In addition to relieving congestion on Turin's Tangenziale, the main bypass highway, the Corso Marche is envisioned as an axis that links utilized and vacant industrial areas such as the Fiat Mirafiori plant in Turin's south and the aerospace engineering plant of Leonardo with a new

university campus, extensive agriculture land and the Campo Volo Airfield in the northern parts. Further, the southern part of the Corso Marche will be crossed by the Ten-T network (Trans-European Transport Network) that includes a train connection between Lyon and Turin. The importance of the Corso Marche Axis becomes especially apparent when looking at different spatial layers. It can for example serve as an arterial road for the Metropolitan Area, as a fast link to the economic triangle of Genoa, Milan and Turin in northern Italy as well as a western connection of the Silk Route on a global scale.

Although it is widely used as a conceptual principle, polycentricity is still a vague concept with various meanings in different contexts and that refers to diverse spatial dimensions. Following the planning studio's definition, a polycentric system can be defined as a network that is not dominated by one centre. The polycentric stakeholders involved in relevant processes along the Corso Marche Axis have impacts and demands, which need to be structured functionally and spatially. At the same time is the local population present at Corso Marche. F04 intends to harmonise the fulfillment of their basic needs with the polycentric demands.

In order to analyse stakeholders and their demands, different methods including the analysis of Italian planning documents of different spatial layers, interviews with stakeholders as well as site visits are used. With regard to the different spatial layers, F04 is going to develop an action plan that visualises the harmonisation of the various demands on the Corso Marche Axis.

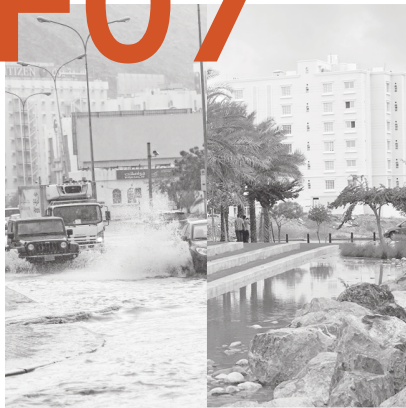
Informationen about the projekt

Projekt F04 | Academic year 2017/2018

Supervisors: Prof. Dr. Thorsten Wiechmann and Dr. Letizia Imbres, Advisors: Prof. Dr. Karsten Zimmermann, Andreas Putlitz

Water sensitive urban design and sustainable water management in Muscat

F07



sustainable watermanagement and water sensitive urban design in Muscat/Oman

In the last decades Muscat, the capital of the Sultanate of Oman, has been affected by a massive growth and economic boom. A consequence of this increase is a vast urban sprawl, which is further reinforced by a low-density type of settlement and limitation of the city's expansion due to mountains and sea to the adjacent plain in the west. In combination with other factors, this prevalent trend leads to a lack of provided technical and social infrastructure, especially in terms of public spaces and parks. Furthermore, the city is built for car traffic which leads to an outstanding deficit of mobility for pedestrians and cyclist. Despite the prevalent arid climate with hardly any precipitation, heavy rain events can occur in the mountainous areas, from where the accumulated water streams down through the city into the sea. These flash floods flow through usually dry riverbeds, called wadis. They fill up with a high amount of water during these torrential rains and cause recurrent flooding that can harm people and effect economic damages. Most time of the year though, wadis constitute dusty ditches in the city structure that separate the neighbourhoods. Moreover, the rapid population growth comes along with an increasing water consumption and therefore a higher quantity of wastewater. Even though treated wastewater is available, just a small portion of it has a designated use which offers the potential

to reuse it for irrigation of green public spaces in the city.

Therefore, the project F07 "Water sensitive urban design and sustainable water management in Muscat, Oman" dealt in the academic year 2017/2018 with the research question "How to integrate wadis as green public spaces into the urban structure of Muscat considering a sustainable water management and flood protection concept?". The aim was to make the unused areas of wadis accessible to the public by creating green public spaces and facilities adapted to the flood risk. While developing the design of green public spaces, the focus was on maintaining the wadis landscape quality and the natural function of draining water into the sea. Additionally, the integration of flood protection measures should reduce the risk for adjacent neighbourhoods as well as users of the wadi parks. Another main aspect was the incorporation of treated wastewater as a sustainable source for an efficient irrigation of the green spaces inside the wadi.

To reach the aim of developing different arrangements for improved waste- and stormwater management, integrating suitable flood protection measures and drafting new attractive green public spaces, the project had an excursion to Muscat. The project participated in a joint workshop with Omani spatial planning students of the German University of Technology to gather the information and material needed for following working steps. The project analysed and evaluated all achieved

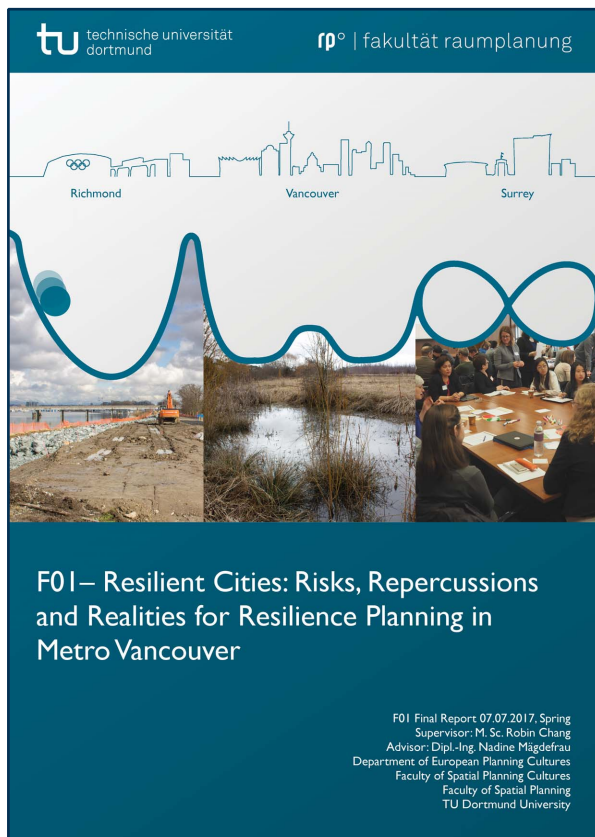
information and developed exemplary drafts for green public spaces in wadis, which are transferable to comparable locations within the city. The drafts illustrate how public spaces can be implemented in wadis as suitable opportunities to use the vacant space, connect neighbourhoods and create open spaces for the population of Muscat. Moreover, the group elaborated a green concept for Muscat serving as a vision for a more viable and sustainable city while providing a sufficient number of parks. Conclusively, the approach serves as an impulse for Muscat's further development and fulfils the demands of water management as well as urban planning.

Informationen about the projekt

Projekt F07 | Academic year 2017/2018

Supervisors: Dr. Ing. Mathias Kaiser, Dr Ing. Wolfgang Scholz, Consultant: Dipl. Ing. Matthias Pallasch

Resilient Cities: Risks, Repercussions and Realities for Resilience Planning in Metro Vancouver



Climate change is the main reason for a rising sea level and changing weather conditions which also result in flooding. As the municipalities Richmond, Surrey and Vancouver in Metro Vancouver, located on the Canadian pacific coast, are affected by climate change, they are required to plan flood protection measures to increase their resiliency. In this context, the research group aimed to find out which resilience concepts are implemented through public measures. There is a consensus on three main concepts of resilience: engineering, ecological and evolutionary resilience. Leading academics discuss engineering resilience as the most frequently applied resilience concept in today's professional context. Following this qualitative hypothesis was examined in the three cities through the following research question:

Which theoretical resilience concepts (engineering, ecological, evolutionary) are implied in the public measures implemented and currently planned for implementation by the three municipalities of Metro Vancouver in order to protect the cities against flooding?

To answer the research question the background of the three resilience concepts and the application of the measures were investigated. The prevailing approach to resilience was highlighted using a criteria table developed by the research group, that categorizes flood protection measures to specific resilience concepts. Additionally, the research group explored different examples of measures on the

ground. While collecting data during the field trip, the project group gained fundamental insights into municipal work and initiatives as well as the theoretical awareness of resilience. Moreover, during two workshops in Vancouver and Dortmund resilience theory and application were discussed between Canadians and German students as well as professionals.

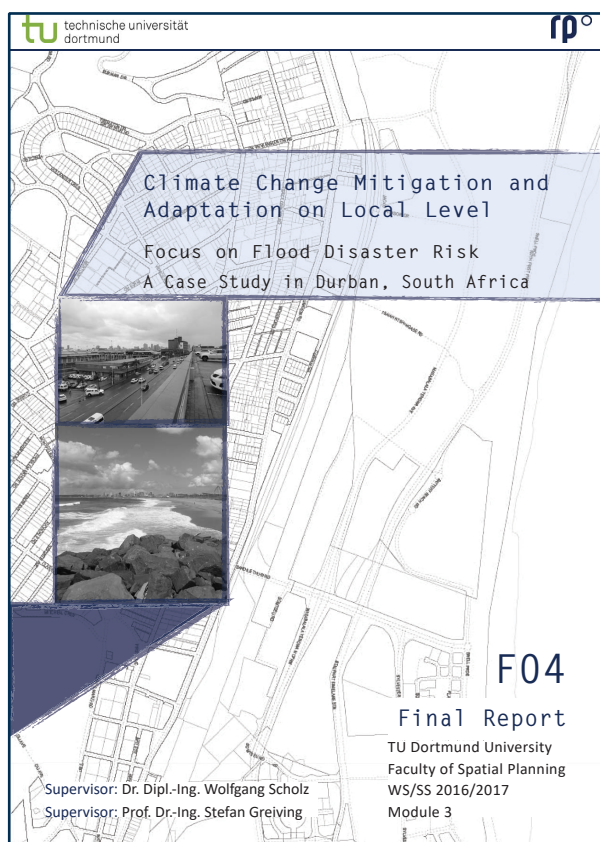
After evaluating the criteria table, the concepts of engineering and evolutionary resilience were identified as the prevailing ones which leads to the falsification of the hypothesis which states that the engineering concept is prevailing. By answering the research question, the project group found out, that all three resilience concepts are implemented by the municipalities but not implied to an equal extent. The added value of the research is to broaden the planners' horizon in terms of flood protection and resilience. As an outlook for further research it could be interesting to undertake a weighting of the criteria table in order to conduct a further analysis with input of local academia. Additionally, it would be of interest if there is a difference in the outcome of the research if only one municipality is considered as the scope. Moreover, it is to be examined who benefits from resilience planning not only in connection to flood protection. The research group is curious to see how the academia benefits from the outcomes of the research work.

Informationen about the project

Project F01 | Academic year 2016/2017

Supervisor: M. Sc. Robin Chang, Advisor: Dipl.-Ing. Nadine Mägdefrau

Climate change adaptation and mitigation on local level. A case study in Durban, South Africa



Durban is the third biggest city in South Africa, located at the Indian Ocean in the eastern province KwaZulu-Natal and crossed by the Umgeni River, which confines the inner city in the north. The city with its subtropical climate has to face different flooding hazards such as storm surges, river floods and heavy rainfall, which constitutes the main topic for the project work of F04. The investigation area is situated in the inner city and limited by the Umgeni River in the north. With the Umgeni Road as a baseline the area is called "Umgeni Road Corridor", which is most affected by the flood hazards. Since flooding hazards cannot be related to climate change yet, the project chose the disaster risk concept as a main approach to examine and decrease floods triggered by urbanisation processes. Furthermore, this concept makes it possible to conduct an analysis with small scaled and only limited data. The disaster risk is constituted through a hazard and vulnerability of the area, which might be affected of the hazard. Flooding events are likely to increase - in magnitude and frequency - due to climate change in long term. However, natural hazards cannot be treated isolated. In the case of Durban, the disaster risk management, as appliance of the disaster risk concept, needs to be combined with two other major spatial aspects, such as the urban transformations of gentrification and informality, which are essential for reaching a comprehensive understanding of the area. Informality in form of informal

trading, like street vending, illustrates an important economic sector which is accepted by the municipality in Durban and often takes place along the Umgeni Road. While informality is more concentrated in the southern part, gentrification processes take place in the northern part of the Umgeni Road Corridor near the Moses Mabhida Stadium. Both issues are indicators for structural development and represent current urban transformations which need to be considered in spatial planning.

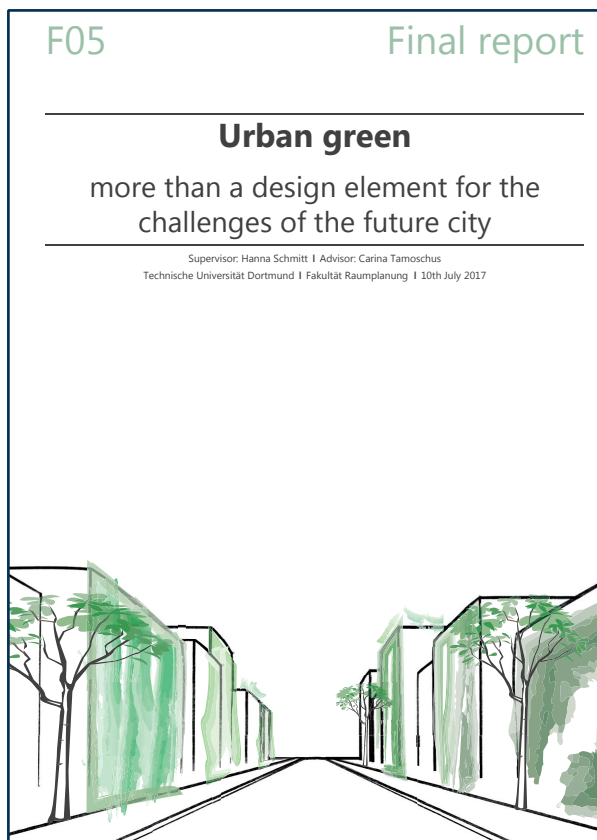
To generate more information about significant problems related to the disaster risk, a vulnerability examination was conducted. Several interviews, a survey, many different focused inventories and additional further methods were conducted and applied. It verified our assumptions of having high vulnerability in the Umgeni Road Corridor. Their results are accumulated on smaller areas of the Umgeni Road Corridor to guarantee a precise location of the problems. Through this examination different vulnerable areas and its reasons can be figured out. In the following, a concept in form of recommendations, which fit best to this analysis of the vulnerability aspects susceptibility, exposure and coping capacity is created. In accordance to the projects encompassing demands, it includes different technical and non-technical starting points. Furthermore, it considers the evaluated framework conditions in this specific corridor. Based on the recommendations for the Umgeni Road Corridor, a generalised concept for areas, which are basically similar or have a comparable structure and vulnerability, is developed. The integrated measures, which are involved in the no-regret strategy, give cities the opportunity to easily apply effective flood management without major interventions like big dams or walls. Both concepts aim to establish disaster risk resilience towards flooding through sustainable and efficient actions by using different approaches and wide spectrum.

Informationen about the project

Projekt F04 | Academic year 2016/2017

Supervisor: Dr. Dipl.-Ing. Wolfgang Scholz, Prof. Dr.-Ing. Stefan Greiving

Urban green - more than a design element for the challenges of the future city



The future city will have to deal with a large variety of social, economic and ecological challenges. As each individual situation may require an individual solution, local city administrations and planning authorities can find a vast number of ways to face them. In its final report, the advanced student research project F05 „Urban green - more than a design element for the challenges of the future city“ points out how urban green can be a key element to face the challenges of the future city.

Especially in a densely populated area it is important to be aware of the variety of social, economic and ecological functions and impacts urban green can have. Local planning authorities are not only the proprietor of many green spaces in the city, but also the ones who have a wide influence on land use and urban structure. For this reason, they need more information about urban green, its functions and impacts and a consideration basis for urban green planning to use it most efficiently.

Concerning this situation the project F05 created a tool which helps local planners applying and improving urban green in a city. The tool consists of a catalogue which contains a classification of 35 different green structures and five blue structures, their description, impacts and functions

as well as indicators to measure them. A guideline explains how to use the catalogue in order to give recommendations on applying and improving urban green. Besides, a classification of different types of urban green, the European project Green Surge developed, was used as a basis for the catalogue. This has been modified in order to correspond with the project's definition of urban green. Furthermore, the development of the tool was influenced by the cities of Bottrop and Vantaa, which cooperated with the project.

To use the tool, first a challenge or problem needs to be identified. The tool enables planning authorities to improve existing green structures as well as to apply new ones. For this, impacts and functions that can counter the problem have to be worked out and a spatial exclusion procedure is necessary. Afterwards, a weighting with other impacts and functions as well as current usages and a recognition of the green structures or improvement measures with the most potential for combating the problem will be done. By this a recommendation for urban green planning can be given.

The tool was tested successfully in two focus areas in the city of Bottrop. One focus area, which is located in the inner city of Bottrop deals with the problem of urban heat islands, while the other focus area, in the district Lehmkuhle deals with the problem of floodings caused by torrential rainfall. With the use of the developed tool, the project worked out how urban green should be improved and applied in these focus areas in order to counteract urban heat islands and floodings and which green structures are most suitable to combat these problems in the two different focus areas.

object F05 | Academic year 2016/2017

Supervisor: Hanna Schmitt, Advisor: Carina Tamoschus

Informationen about the project

Project F05 | Academic year 2016/2017

Supervisor: Hanna Schmitt, Advisor: Carina Tamoschus

Public transportation in a growing city - a case study of Kisumu, Kenya



The project - "Public transportation in a growing city – a case study of Kisumu, Kenya" is dealing with the transport modes operating in Kenya's third largest city. An important part of the research is the existing travel supply in the city and the transport policy.

During the work process the students got an insight into the informal and formal transport system of the growing city Kisumu. One aim of the project was to analyse the inhabitant's mobility in the city and furthermore to present possibilities and existing strengths lying within and identify concerning extends of its development. Therefore the project generated the following research questions:

„What are the potentials and deficits of the transport system under the guiding principle "liveability in Kiusmu?"

And „How can this growth be guided by the different actors in the planning process to establish a transport development for the common good?"

The project's objective was to point out possible policies and measures for Kisumu's transport system, to increase the liveability of its population. The identified challenges

within the urban development in the city are the upcoming motorisation, the safety measures and the resulting social exclusion. The main focus of the project regarding the transport system in Kisumu were the needs of the population. Therefore the topic of liveability in connection with the transport system will be viewed under the aspects of accessibility, equality, affordability, safety and sustainability.

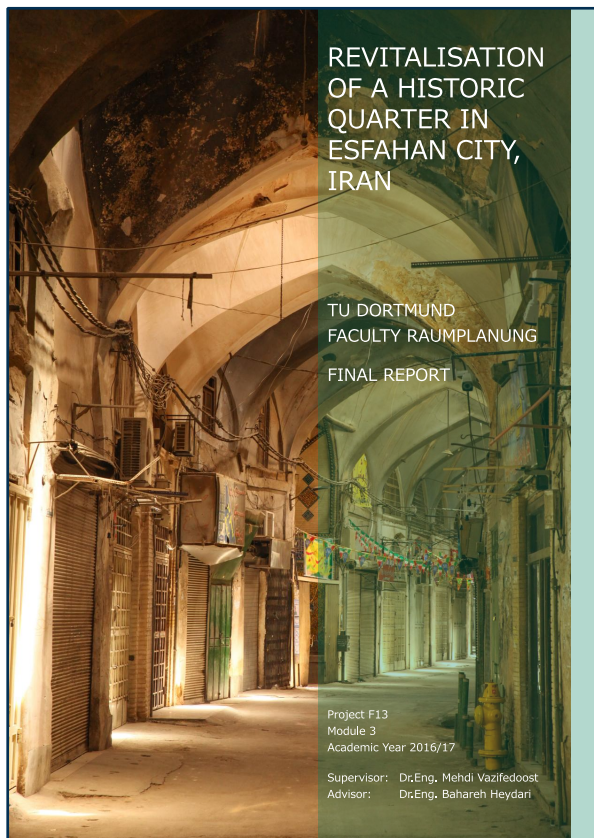
The visit of Kisumu enabled the students to generate concrete measures, which could develop the transport system sustainably. As a result the project formulated a guidance focusing on improving the inhabitants' liveability. This guide contains various exemplary ideas for improving the local traffic situation.

Informationen about the project

Project F12 | Academic year 2016/2017

Supervisor: Dipl.-Ing Alexander Reicher , Dr.-Ing Nadine Appelhans, Dr.-Ing Walter Aland

Revitalization of Historical district in Isfahan City, Iran



Esfahan, the composition of the city, the population, the economy and the green and natural elements. During the excursion, the project obtains the experience of the country in all its facets. In cooperation with the local university, Daneshpajooan Higher Education Institute (DHEI), the project conducts a qualitative primary data analysis. By the means of site visits and observations, the perception of the urban structure and the interaction of the people are created. Expert talks help to get profound opinions about the issues in the quarter. Furthermore guided interviews with space users are performed to get insights of their problems and needs. Out of this data collection, the project analyses the results and develops strategies for a comprehensive and sustainable revitalisation with the aid of a SWOT analysis. In cooperation with that, a vision is created which includes different objectives belonging to each of the four aspects. The vision intends to serve as a guideline, showing how the quarter should develop and how it should look like in the future. In this way the project generates 13 strategies, e.g. reduce and regulate motorised traffic, create inter-linked and qualitative public green and blue spaces and enable and institutionalise civic participation. Each of these strategies goes along with a set of measures, which are supposed to fulfil the strategy. The measures are situated in different fields of action, in order to get a more detailed concept of the quarter. As a result the project works out a recommendation, how a sustainable revitalisation in the historical centre of Esfahan could look like.

The project F13 deals with the revitalisation of the historical districts of Golbahar, Bazar and Shahshatan, which are part of the urban centre of Esfahan, Iran. The historical part of Esfahan City has a central function concerning the identity and cultural association of the city. Ancient buildings and public places are fundamental parts of the city's charm and appeal. The importance of the quarter arises from the bazaar as an economical centre and the neighbourhood system as a social centre. As the currently arising modern needs are not conform with the old urban structure, this quarter is losing its function and importance. Therefore, the city has to deal with physical, socio-cultural, ecological and economical conflicts of the quarter. The challenge for the project work is to analyse the current situation as well as to determine problems the quarter is facing. This leads to the project's research aim, which is the development of strategies for a sustainable revitalisation.

To define the term sustainable revitalisation the project composes a model containing four dimensions: the physical, the socio-cultural, the ecological and the economical. These four aspects are inter-dependent and must be considered as relating to each other all the time. The political-administrative dimension can be seen as a framework, in which the other four aspects act.

Via literature research, the project collects information about the country with its geographical conditions, the urban characteristics, the culture and the planning system. Next, the focus is on the City of

Informationen about the project

Project F13 | Academic year 2016/2017

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Bahareh Heydari

Imprint



Photo: Christian Lamker

Editor of this publication:

Sandra Fortuna

Layout:

Sandra Fortuna, Mona Heitwerth

Picture Credits:

Title pages created by the projects themselves.

Otherwise unless otherwise stated:

Faculty of Spatial Planning

Print:

Zentrale Vervielfältigung der TU Dortmund


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