# Urban Nature in Daily Doses

## Restorative design strategies for improved personal and ecological well-being in Berlin

Clarissa Bechmann

**Master Thesis**
MSc Architecture, Urbanism and Building Sciences-Track Urbanism
Faculty of Architecture and the Built Environment
Delft University of Technology

Urban Nature in Daily Doses -
Restorative design strategies for improved personal and ecological well-being in Berlin

Graduation Lab: Metropolitan Ecologies of Places

Author: Clarissa Bechmann
Student number: 5634520

Supervisors
First Mentor: Dr. Ir. R.M. (Remon) Rooij - Spatial Planning and Strategy
Second Mentor: Dr. Ir. N.M.J.D. (Nico) Tillie - Landscape Architecture
Delegate of the Board of Examiners: Wing Yung

Copyright 2023 All rights reserved. During the making of this report references for text and figures are mentioned in the chapters and literature list. The remaining images are created by the author and can be used or reproduced while mentioning this report as a reference.

TU Delft BK Bouwkunde Urbanism

Organic shapes
Tiergarten, Berlin

"People often say they like nature; yet they often fail to realise that they need it. [...] Nature is not merely 'nice'. It is not just a matter of improving one's mood, rather it is a vital ingredient in healthy human functioning." (Kaplan, 1992, p. 141)

## Summary

The report is part of a graduation project within the field of Urbanism and investigates the impact of urban environments on personal and ecological well-being, with a focus on the decreasing quality of life in cities due to the diminishing urban green spaces resulting from growing urbanisation and densification. Moreover, the report highlights the importance of natural environments in mitigating daily stresses and the consequences of climate change. Therefore, preserving and enhancing urban nature at all scales is vital.

As part of the study, the pattern language "Restoration with Urban Nature" was developed to create design principles for improving personal and ecological well-being. The pattern language is organized into six categories that provide overarching, general patterns as well as suggestions related to activity, environment, senses, and implementation. Additionally, it contains a few "bonus patterns".

Resulting from the pattern language, design principles are applied to the design location Moabit West in Berlin and then transferred to two other areas in Berlin: Helmholtzkiez and Flughafenkiez. A co-creation workshop with stakeholders from the first design location was also held to test the pattern language and ensure a participatory design process.

Furthermore, the project utilises ecosystem services and parameters of restoration to evaluate the effectiveness of the design principles.

The results of the study provide insights into how urban design can improve personal and ecological well-being in urban areas by creating restorative environments with a focus on urban nature. Thus, an integrated approach that considers the various needs of humans and natural systems is needed to improve restoration and the provision of ecosystem services in Berlin and other urban contexts.

As personal and ecological well-being are strongly related, social-ecological urbanism holds high potential for cities. Consequently, the thesis contributes to the development of sustainable urban design strategies that prioritise the preservation and enhancement of urban nature for the benefit of both residents and the environment.

The findings are relevant for urban planners, designers, and policymakers who seek to create health-promoting and climate-adaptive urban environments. In order to implement the developed principles, raised awareness of the urgency of the topic is needed among all stakeholders. Furthermore, interdisciplinary cooperation fosters the successful development of restorative environments.

Finally, with its versatile green structure, the city of Berlin holds high potential for providing restoration and ecosystem services. The challenge lies in discovering and valuing those potentials.





Keywords:

*restorative environments, urban nature, well-being, pattern language, ecosystem services, Berlin*

The journey of the graduation project was not a solo trip but the collaboration of many inspiring, supporting, and helpful people.

To begin with, I want to thank my mentor team for encouraging me throughout the whole process. Remon, thank you for your time, well-grounded input, and questions that always positively challenged me to make the most out of the project. Nico, your class in Q4 inspired me for the graduation topic and I thank you for opening my view to the larger context while simultaneously paying close attention to the details.

My thanks also go to everyone involved in Berlin that contributed to the thesis by answering my questions, giving valuable insights, and supporting the co-creation workshop. Without you, the core part of the project - the people - would have missed.

Moreover, I am thanking my parents for their love and support at all times. Luckily, you made sure that I played in nature while growing up. Also, the emotional support of my friends was irreplaceable. Thank you for being there for me - here and with hundreds of kilometres of distance. Special thanks also go to my second family in the Netherlands that made the whole master's to an unforgettable experience. Together we made sure that our work-life balance stays even and the coffee stamp cards get full.

Finally, I am truly grateful for everyone that was part of this journey. Without all of you, this project would not have been possible in that way.

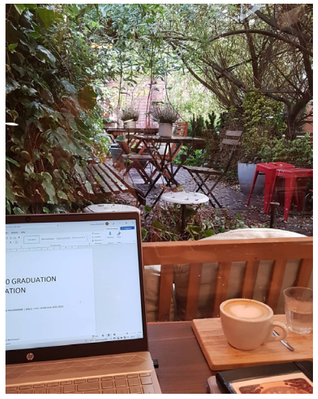




*People shape places and places shape people.*

A simple sentence, yet it describes very well my fascination for urbanism and the driving idea behind my graduation project. I am curious about understanding the correlation between the urban environment and the people living there. My research is further driven by two fields that I am very passionate about: psychology and nature. I realised that going to the park close by whenever I need a break helps me a lot to relax and clear my mind. Starting from there, I became curious: why are we drawn to nature?
For me, humans and nature are strongly connected but nowadays this connection often got lost and not everyone is aware of the importance of nature in their daily life.

Growing up in Berlin, one could call me a "city child" but luckily I had the chance to spend every weekend and the holidays camping in the countryside. Strolling through forests or helping at my friend's farm shaped me and my relationship with nature. As I got older, I realised how valuable a green living environment is and how difficult it can be at times to find those spaces in the city. Starting by myself, I always seek to be surrounded by nature in all its various forms: the plants in my room, study places with a green view, planting herbs in my little backyard, or walking through the urban forest next door.
Yet, not everyone has the possibility to experience green spaces in their daily life. Lacking awareness and decreasing nature contact among children are also part of the problem. Given the amazing effects of nature, I want to find ways to incorporate it into the urban environment for everyone.
With my graduation project, I hope to give a voice to people's and nature's needs to consequently highlight the necessity of a social-ecological approach to urbanism. And I believe that even the smallest intervention can make a difference.



*"Cities need green in sizes S,M,L and XL. Otherwise the human ecosystem is incomplete."*
(Gil Peñalosa, as stated in Montgomery, 2015, p. 123)

# TABLE OF CONTENTS

# CHAPTER 1

## INTRODUCTION

The first chapter introduces the problem at hand with its academic and societal relevance. Furthermore, the research aim and research questions in combination with the methodological framework are explained.


The Urban Environment
Mitte, Berlin

Städter

Nah wie Löcher eines Siebes stehn
Fenster beieinander, drängend fassen
Häuser sich so dicht an, daß die Straßen
Grau geschwollen wie Gewürgte sehn.

Ineinander dicht hineingehakt
Sitzen in den Trams die zwei Fassaden
Leute, wo die Blicke eng ausladen
Und Begierde ineinander ragt.

Unsre Wände sind so dünn wie Haut,
Daß ein jeder teilnimmt, wenn ich weine,
Flüstern dringt hinüber wie Gegröle;

Und wie stumm in abgeschloßner Höhle
Unberührt und ungeschaut
Steht doch jeder fern und fühlt: alleine.

Alfred Wolfenstein (1914)

# 1.1 ACADEMIC MOTIVATION

Historically, urban planning aimed to improve the physical health of people living in densely built and polluted cities as a consequence of industrialisation. But just in recent years, the relationship between the built environment and well-being has started to receive more attention again (Roe & McCay, 2021; Montgomery, 2015). As we are facing an era of rapid urbanisation with the majority of the population living in cities by 2050 (United Nations, 2019), the awareness of the influence of cities on people's and nature's well-being must rise. Also, there is a proven correlation between a higher risk of developing mental illnesses and a higher stress level when growing up or living in cities than in rural areas (Adli & Schöndorf, 2020).



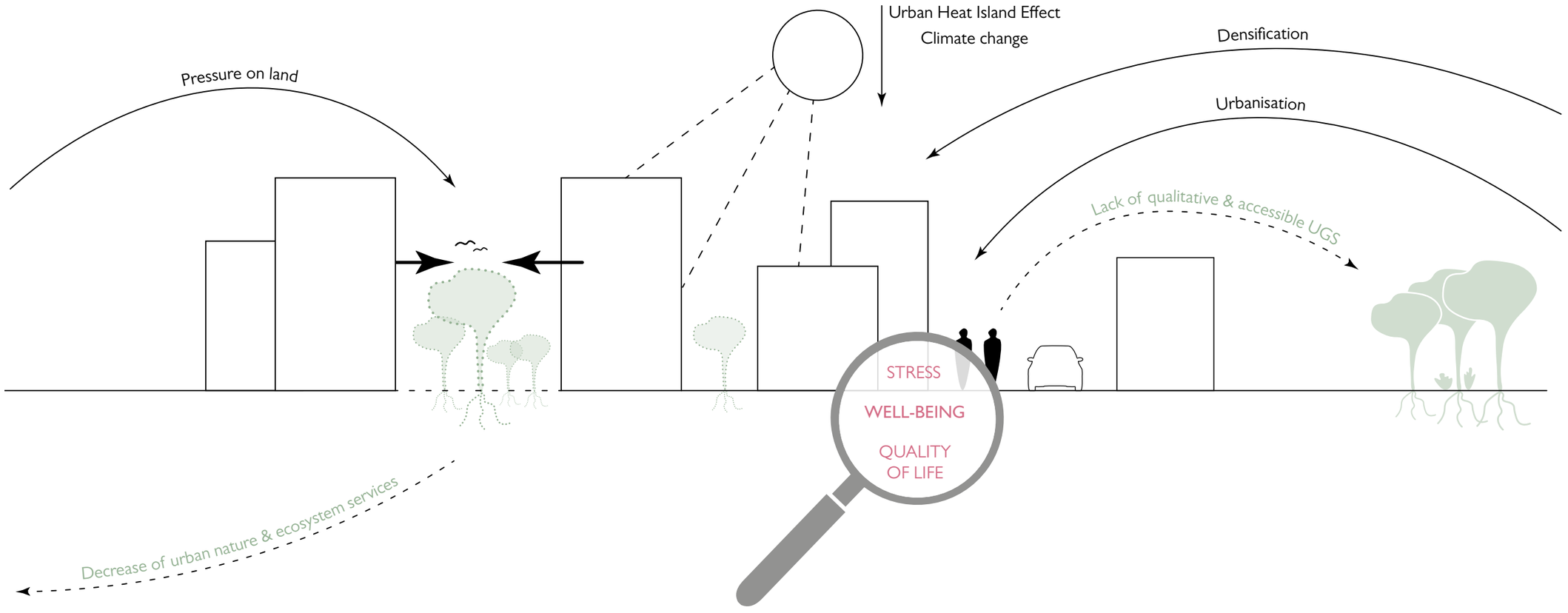
Growing urbanisation comes along with increasing densification, which puts pressure on existing urban green spaces. Especially in dense inner-city districts, urban green spaces are rare to find yet even more important due to their provision of health-supporting ecosystem services and positive effects on well-being (Kabisch & Haase, 2014; Millenium Ecosystem Assessment, 2005; Ullrich et al., 1991; Kaplan, 1992).
Additionally, the need for spaces for restoration is rising as the housing market is in a crisis which forces people to live under confined conditions. It is therefore necessary to find solutions how to improve the personal well-being in an integrated way through different scales.

A city that is characterised by both, rapid growth, and densification on the one side, and an overall high proportion of green spaces of about 40% of the city area on the other side, is Berlin in Germany.
Still, a high percentage of green does not guarantee qualitative and accessible spaces for everyone. So are 20% of Berlin's residents not living in proximity to sufficient urban green spaces (UGS) and many parts of the inner-city districts are undersupplied with urban green spaces close to home (Coppel & Wüstemann, 2017; Umweltatlas Berlin, 2020). Moreover, the unequal access and distribution of green spaces among the population as well as the exposure to health-affecting urban stressors are also examined from the point of view of environmental justice, which has got growing importance in Berlin's planning practice (Kabisch & Haase, 2014; SenUVK, 2019a).

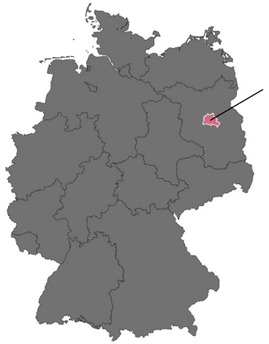
Next to the threats to the quality of life for human residents, the current planning practices negatively impact the urban climate and ecosystems for non-human inhabitants of the city, too. Shrinking urban green spaces lead to increased biodiversity loss and rising heat stress, which is also a risk to human health (Singh et al., 2020).
As urban nature fulfils an important role regarding the mitigation of climate change and the improvement of well-being, its relevance is often highlighted in theory but not yet always reflected in practice (Breuste et al., 2020; Vink et al., 2017; SenUVK, 2020).

Urbanisation
Märkisches Viertel, Berlin

# 1.2 PROBLEM EXPLORATION AT THE CASE OF BERLIN




[Fig. 1] Problematisation



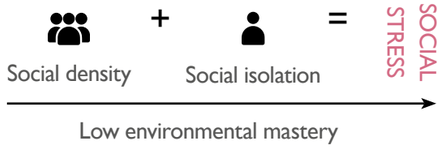
Highest occurrence of depression in Berlin

(*in national comparison; RKI, 2021)

[Fig. 2] States of Germany, adapted from BKG, 2021

Living in cities affects our well-being. While cities offer numerous benefits, there are also various factors that negatively impact our health. The following part will explore which aspects are relevant in the urban context.

There are two types of stress that occur especially in cities: social stress and urban stress. Social stress is the result of social density in combination with social isolation while experiencing little control about the own environment (Adli & Schöndorf, 2020).




[Fig. 3] Social stress (by author, adapted from Adli & Schöndorf, 2020)

*39%* higher risk for developing depression*
*21%* higher risk for developing anxiety disorder*
*2-3x* higher occurence of schizophrenia*

*when living in cities in comparison to rural areas (Adli & Schöndorf, 2020)

Social density goes along with crowding and the feeling of lacking personal space. On the other hand, urban life is often characterised by higher anonymity that leads to feeling socially isolated and lonely. As Montgomery (2013, p. 54) put it:

*"Social isolation just may be the greatest environmental hazard of city living - worse than noise, pollution, or even crowding."*

Social isolation plays an important role in personal well-being but as the project is taking an integrated approach, other important factors are examined as well. So can various urban stressors that cause urban stress be found in the urban context (see Koene, 2018). Here, a distinction is made between stressors from the built environment, social urban stressors, stressors from urban conditions, and health stressors. In the theory chapter (chapter 2), the urban stressors are explained more in-depth.
Nevertheless, a selection of relevant stressors, occurring at the case study location Berlin, is presented here.

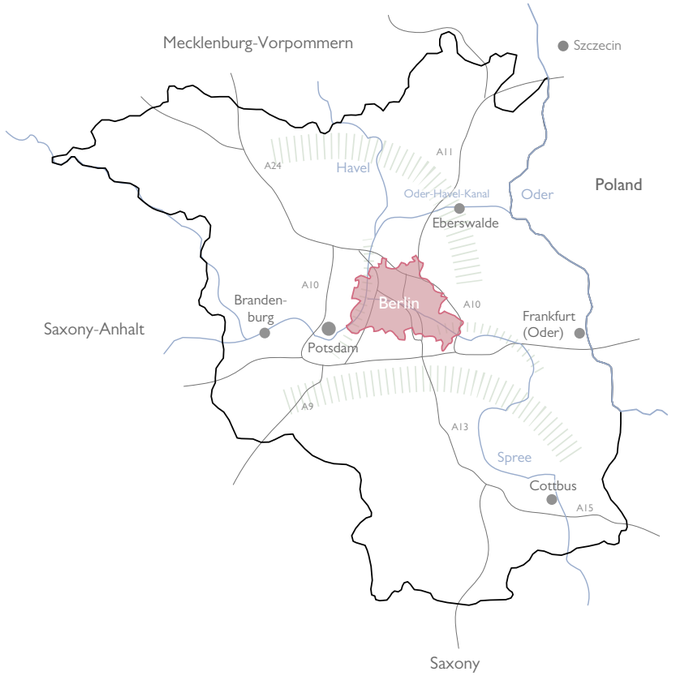


[Fig. 4] Traffic

[Fig. 5] Lack of greenery

[Fig. 6] Garbage on streets

[Fig. 7] Crowding



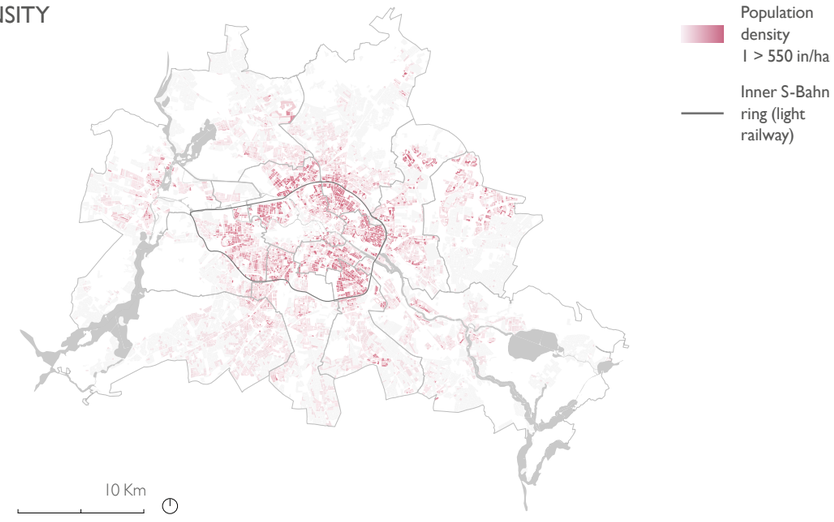

[Fig. 8] Integration in regional structure

Berlin is located at the eastern part of Germany. It is surrounded by the federal state of "Brandenburg", which has with 34.9% in 2021 the fifth largest forest share in a Germany-wide comparison. By way of comparison, 29.8% of Germany's total area consists of forests and in Berlin 17.7% forest area can be found (Statistisches Bundesamt, 2022). Moreover, the rivers "Spree" and "Havel" pass through Berlin.

The city is divided into 12 districts and the inner S-Bahn ring (light railway) marks the central area. Furthermore, Berlin is well connected within and beyond the city borders with public transport and highway connections.



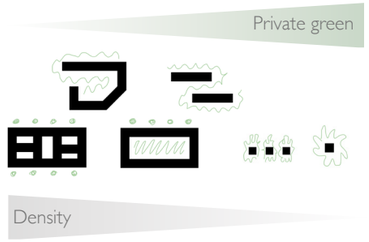

[Fig. 9] Overview Berlin



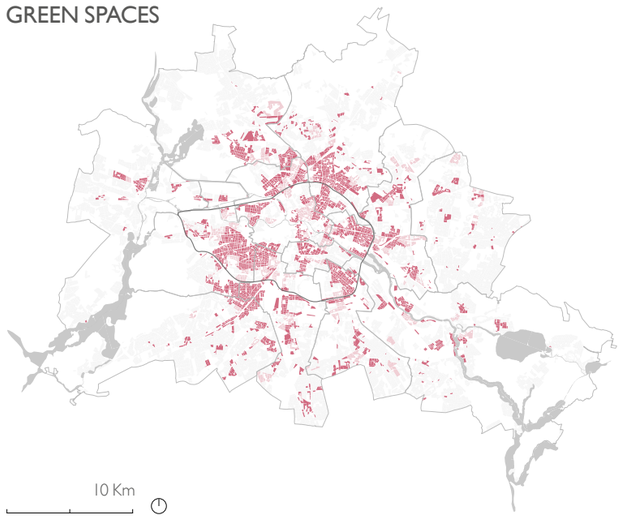

[Fig. 10] Population density, 2021 (by author, based on Amt für Statistik Berlin-Brandenburg, 2021a)



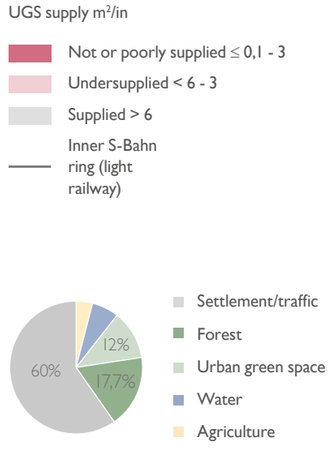
Berlin is as the capital of Germany the biggest city of the country with currently 3.8 Mio. inhabitants and a surface area of 891 $m^2$ (AsF, 2022b). As the numbers of influx are showing, it is a popular destination, especially for people from abroad (AfS Berlin-Brandenburg, 2022a). But the continuous population growth puts pressure on the land and new challenges are occurring. In an already densely built-up city, every square meter is highly competitive. The need for new homes conflicts with the current land use and new development projects are likely to negatively impact existing urban nature (Pauleit et al., 2018). Currently, the average density is around 42 inhabitants per hectar (in/ha) and therefore in the medium range in comparison to other big cities (Umweltatlas Berlin, 2021). It is noticeable that the population density is the highest in the inner city districts inside and adjacent to the inner S-Bahn ring (light railway). Here, up to more than 550 in/ha live within the old closed block structures that were built between 1870-1918.




[Fig. 11] Density to private green relation




[Fig. 12] Lack of urban green spaces in proximity, 2020 (by author, based on Amt für Statistik Berlin-Brandenburg, 2020)



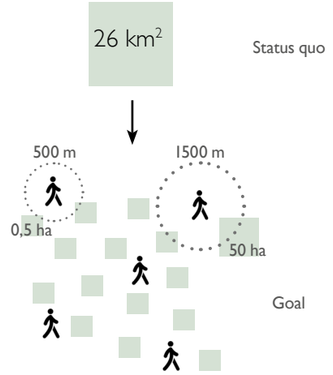

[Fig. 13] Land use share, 2021 (by author, based on SenUMVK)





With rising density the amount of available private green spaces decreases. Therefore, the provision of public accessible green spaces is even more important. But as Fig. 10 is showing, many of the densely populated areas are lacking urban green spaces in proximity to home. A radius of 500 m around the home is considered as "close-to-home" and fulfils a crucial role in urban green space provision, especially for less mobile people (Umweltatlas Berlin, 2020).

Moreover, Berlin aims for a threshold of 6 $m^2$ urban green spaces per capita (Kabisch & Haase, 2014). This number is currently met on average but the availability and accessibility of these spaces is unequally distributed.




[Fig. 14] Distribution of UGS (by author, partly based on Kabisch & Haase, 2014)

## QUALITY AND AWARENESS OF GREEN SPACES

Next to the unequal availability, the quality of the green spaces is often questionable. The pictures were taken during the fieldwork and are based on personal obeservations. Furthermore, in dialogue with residents and professionals problems regarding the misuse of UGS were formulated as well. In a city with a very heterogenous structure of inhabitants, these spaces function as valuable places of encounter but at the same time conflicts are more likely to occur here (SenSU, 2014a). Given the varying interests and usage, UGS fulfil different functions simultaneously. The resulting multicoding of green spaces brings challenges for the environment and requires a good cooperation between municipality and residents (SenSU, 2014a).
Nevertheless, there is a growing awareness of the importance of UGS for a healthy and liveable city and the relevance of preserving natural environments is acknowledged (SenSU, 2014a; SenUVK, 2020). Thus, the city of Berlin commits in the "Charter for urban nature in Berlin" (SenUVK, 2020) to foster and improve urban nature as important spaces for recreation, social cohesion, habitats for various species, and meausures for climate adaptation. So it says:

*"We emphasise: Citizens need access to urban green space close to their homes, enabling them to relax, meet and exercise. This is also a contribution to environmental justice."*

(SenUVK, 2020, translated from German by author)



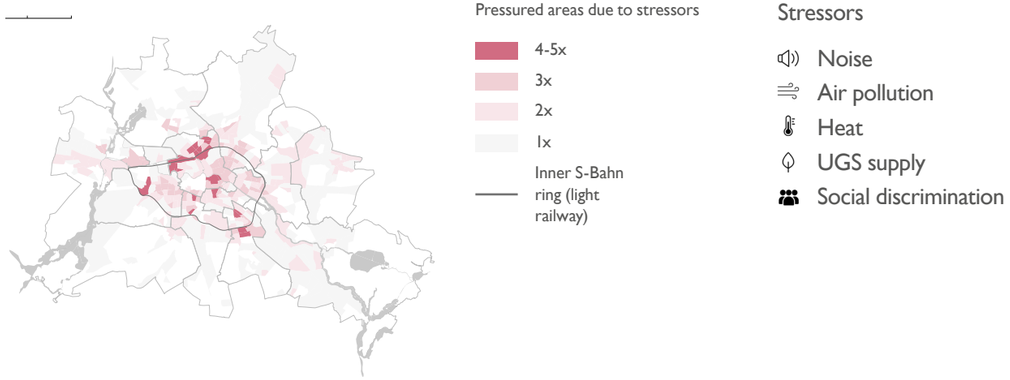
[Fig. 15] Traces of drug consumption

[Fig. 16] Lacking maintenance

[Fig. 17] Trees used for bike parking


[Fig. 18] Postcard, Awareness for wildlife preservation (made by children as part of the project "Sauberes Berlin")

## ENVIRONMENTAL JUSTICE



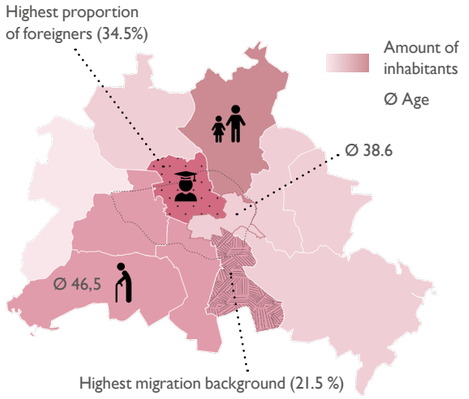

[Fig. 19] Environmental justice - stressors, 2021 (by author, based on Amt für Statistik Berlin-Brandenburg, 2021b)



Environmental pressure on well-being due to different stressors is higher in socially disadvantaged areas. Thus, additional burdens of noise, air pollution, and heat stress occur where the people live already under challenging housing and personal conditions. The stressors negatively impact health and can lead to respiratory and cardiovascular diseases as well as urban stress (Burton, 1990). Health-promoting green spaces are also lacking in pressured areas, resulting in an unfair distribution of healthy living conditions in society (SenUVK, 2019a).
To enable fair and equal conditions for a healthy life for everyone is the goal of environmental justice and is highlighted in the aims of Berlin's planning practice (SenUVK, 2019a).
Next to the environmental aspects, socio-economic factors have a high influence on well-being as well (Adli & Schöndorf, 2020). When taking a look at the socio-economic circumstances in Berlin, the differences within the districts become clear. So are especially in the inner city districts Neukölln, Mitte, and Friedrichshain-Kreuzberg the highest proportion of foreigners and people with migration background, the highest unemployment rate and lower life expectancy found (AfS, 2021; SenWGPG, 2022).

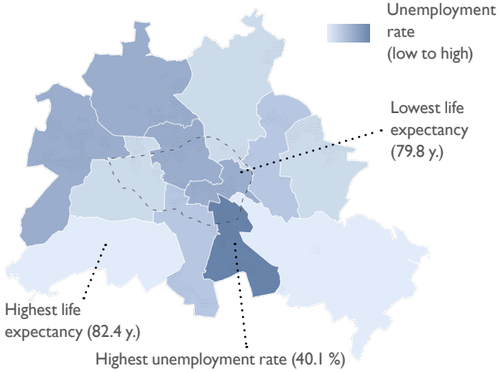
The resulting challenge for the project is to improve the conditions within the pressured areas with the different requirements of society in mind (BfG, 2022).

## SOCIO-ECONOMIC FACTORS



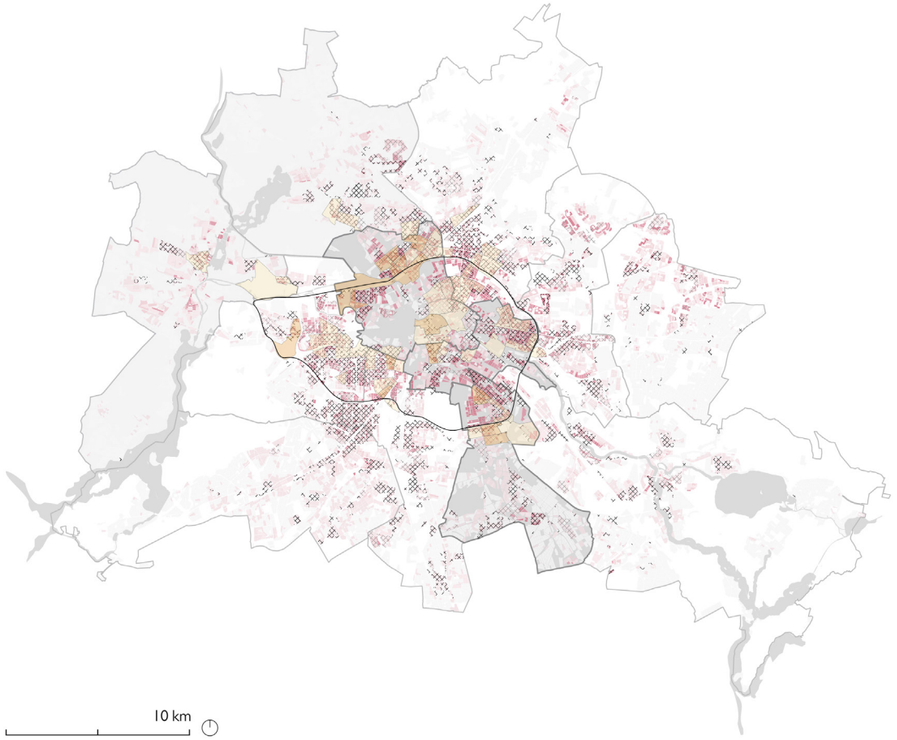

[Fig. 20] Migration background and age, 2021 (by author, based on Amt für Statistik Berlin-Brandenburg, 2021c)


[Fig. 22] Highlighted districts




[Fig. 21] Employment and life expectancy, 2021 (by author, based on SenWGPG, 2022)

[Fig. 23] Gender distribution, 2021 (by author, based on Amt für Statistik Berlin-Brandenburg, 2021d)




[Fig. 24] Synthesis map with most pressured areas based on urban stressors


[Fig. 25] Juxtaposition of urban stressors and environments to restore from stressors

The previous section presented the current problem at the example of Berlin. Firstly, the case study location was introduced in general, and the influence of cities on well-being was illustrated.
The consequences of growing urbanization and the resulting pressure on rural areas and the shrinking urban green spaces were also explained.

The synthesis map on the left (fig. 24) summarises spatially the various factors that influence well-being in cities. It becomes apparent that the most significant effects are concentrated in the central districts.

In the following section, the resulting problem statement, the research aim, the design objective, and the intended outcomes are presented.

## PROBLEM STATEMENT

The conditions of living in cities highly affect personal well-being. With growing urbanisation and densification, the **quality of the built environment** often decreases, especially in terms of the **availability of urban green spaces**. As these spaces have essential **restorative functions** for humans and provide **ecosystem services** as well as positive impacts on the urban climate, the preservation and qualification of urban nature at all scales is a very important challenge.
Still, there is **lacking awareness** of that issue which is reflected in planning decisions and individual behaviour.

## RESEARCH AIM

The project aims to create a **better understanding and awareness** of the interrelation between the well-being of people, urban nature, and the built environment. The intention is to improve the **livability** in cities by focussing on the influence of daily life nature experiences in the context of urban stressors to consequently strengthen **personal and ecological well-being**.
Additionally, research on different concepts related to the main problem field is translated into **specific design interventions** to build the missing bridge between theory and practice. Also, by **involving actors** from different disciplines, knowledge can be shared and applied in various settings.

## DESIGN OBJECTIVE

Enabling direct and indirect **daily contact with urban nature** for improved well-being is the objective of the design. Increased contact and awareness of nature go along with the preservation, qualification, and new development of **urban green spaces as restorative environments**. Thus, the qualities of ecosystem services are in focus. Moreover, the design intends to improve the living conditions in urban environments for everyone whilst increasing **biodiversity** and mitigating the consequences of **climate change**. The design interventions should consider the manifold needs of the residents and avoid green densification.

## INTENDED OUTCOMES

The resulting outcomes of the study are **design strategies** for restorative environments that contribute to personal and ecological well-being on different scales. They are applied to the study area of Berlin with a focus on chosen neighbourhoods. The development of a **pattern language** is here the guiding instrument. Furthermore, the approach varies by the focus areas from **visions and guidelines** to an **analysis and co-creation workshop** with different stakeholders.
The operationalisation of concepts into patterns for designing and planning is intended to help raise awareness among professionals and residents for the problem discussed. Moreover, the analysis of current policies and guidelines and the formulation of lacking ones guide the **realisation** of the design strategies and theoretical knowledge into practice.

# 1.3 PROJECT APPROACH AND APPLIED METHODS

The project is based on the main research question that provides guidance for the research. Supporting sub-questions are formulated to answer the main research question. In order to structure the whole project, a methodological framework was developed that provides the different methods to approach the sub-questions. In the following section, the research questions and the methodological framework are presented.

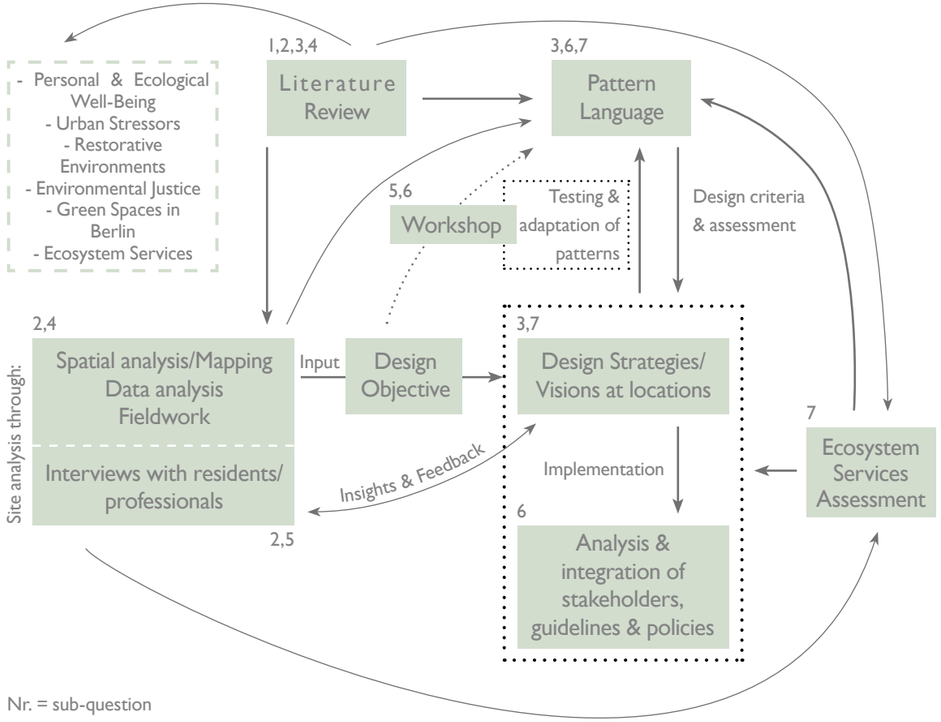


## RESEARCH QUESTIONS

*How can urban green spaces in Berlin contribute to creating restorative environments that improve the personal well-being of residents as well as the quality of ecosystem services?*

Supporting sub-questions:

1. Which factors in the urban environment influence personal well-being?
2. What is the current state of personal well-being of the people in the metropolitan region of Berlin and in the focus areas?
3. What are the characteristics of restorative environments and how can they be translated into design solutions?
4. What is the status quo of urban green spaces in Berlin regarding their quality, quantity, and accessibility?
5. How do the residents in the chosen neighbourhoods experience the relationship between their personal well-being and urban nature?
6. Which stakeholders, policies, and guidelines are needed for the implementation of the design interventions into the planning practice to consequently raise awareness for the importance of urban nature?
7. How can the design be evaluated based on its contribution to urban ecosystem services?




[Fig. 26] Methodological framework



The methodological framework displays the different methods used in the project to approach the research questions. Moreover, it shows the relations between the methods.

*Literature review*
A key component in the first phase of the project is the literature review that forms the basis for the theoretical background of the project. Research on the main concepts offers answers to several sub-questions and provides the theoretical basis for the development of a pattern language.

*Site analysis*
Criteria and ideas for the site analysis are gained through the literature review beforehand. The spatial analysis and mapping of the current situation together with the analysis of data related to the sites form the basis for the fieldwork. Based on observations and interviews with residents and professionals on-site, a better understanding of the challenges and potentials of the focus areas is gained. Consequently, the insights are used for the design.

*Design objective*
Based on the results from the literature and site analysis, the design objective is formulated. It is strongly related to the problem statement and research aim as well as to the conditions on-site that influence the focus of the design objective.

*Pattern language and design strategies/visions*
Bridging theory and practice, a pattern language is developed to form the basis for restorative design strategies and guidelines. The creation of design interventions for the focus areas is based on the pattern language and varies from visions to a more detailed design. The patterns are applied to the suitable settings and can function vice versa: they offer criteria and assessment of the design but also the design interventions reflect on the patterns. Thus, the patterns can be tested and adapted through the design.

*Workshop*
A workshop with residents and stakeholders from different institutions is carried out to test the pattern language and work on a design for the chosen area together.

*Implementation strategy*
Supplementary to the design and visions at the locations, a strategy for the implementation of restorative design strategies is made. It is based on the analysis of involved stakeholders, current guidelines, and policies in Berlin and the national context. Statements are formulated to show the realisation possibilities for current and future planning practice.

*Ecosystem Services Assessment*
Another crucial aspect that plays a role in the assessment of the pattern language, design strategies, visions, and implementation strategy is ecosystem services. The project is evaluated based on its contribution to ecological and personal well-being, considering a selection of ecosystem services.

# 1.4 RELEVANCE

## Societal relevance

The awareness for personal and ecological well-being is rising in recent years but is still an under-represented topic in the field of urbanism. The graduation project aims to clarify the influence of urban environments on people's and nature's well-being to consequently improve the livability of humans and non-human organisms in the city.

Considering the United Nations Sustainable Development Goals, the assurance of healthy lifes and the promotion of well-being for everyone (United Nations, 2015, Goal 3), as well as "inclusive, safe, resilient and sustainable" cities and human settlements (United Nations, 2015, Goal 11) are relevant and recent topics.


[Fig. 27] Sustainable Development Goals (UN, n.d.)

Especially, in view of environmental justice it is enormously important to enable healthy living conditions for all societal groups (SenUVK, 2019a). By developing urban green spaces that enable stress reduction and improve well-being, the quality of life increases and opportunities for healthier societies arise. As the quality of life is strongly related to the state of the environment, the importance of ecological well-being and the human impact on the environment is apparent to be highlighted as well (Grouzet & Lee, 2014).

Moreover, raising awareness of the importance of well-being when planning and designing cities, enhances the feeling of inclusion (Roe & McCay, 2021). That goes along with identification and responsibility for the environment which are important values to strive for in the urbanism practice.

By incorporating participation into the planning and design process, different needs are better understood and included in the decision-making. Therefore, direct contact with residents on site plays an important role in the project. Using methods to enable exchange with different user groups via street conversations, semi-open interviews with professionals, and a co-creation workshop with various stakeholders puts theory into practice: planning with and for the people to ensure inclusion and resilient outcomes.

## Scientific relevance

Research from different fields has been done on the effects of urban environments on mental health (Halpern, 1995; Ulrich, 1991). Moreover, the role of restorative environments and urban stressors has been studied (Kaplan, 1992; Koene, 2018), and just recently guidelines for restorative Urbanism were published (Roe & McCay, 2021).

The graduation project applies existing research to the specific case study location of Berlin and the findings are transferable to other contexts later on. Since the research of the project is done on personal well-being in the context of the built environment but also on ways to design more nature inclusively to contribute to qualitative ecosystem services, the findings lead to more specific guidelines for restorative environments from the point of view of Urban Ecology.

Furthermore, by translating research and experience into the development of the pattern language "Restoration with Urban Nature", patterns can be applied to Berlin but also transferred to other settings and consequently be useful for other professionals and locals. In addition, the pattern language facilitates the knowledge exchange between stakeholders from different fields, which contributes to a greater awareness of the problems and opportunities presented in the project.

# 1.5 READING GUIDE

| ANSWERS TO | |
|---|---|
| | 1. Introduction<br>Context and research approach |
| RQ 1, 3 | 2. Theoretical background<br>Concepts |
| RQ 3, 6 | 3. Bridging theory and practice<br>Pattern Language |
| RQ 2, 4, 5 | 4. Case study location: Berlin<br>Analysis and fieldwork |
| RQ 3, 6, 7 | 5. Design & Strategy<br>Vision, guidelines and assessment |
| **Main research question** | 6. Conclusion<br>Reflection and recommendations |



Allotment gardens
Pankow, Berlin

# CHAPTER 2

## UNDERSTANDING HUMAN-NATURE RELATIONSHIPS

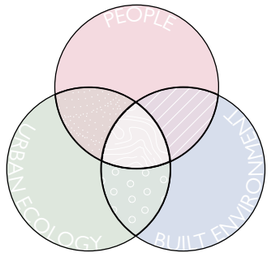
The second chapter provides the theoretical background of the project, based on relevant literature. It gives an understanding of the key concepts of restorative environments, personal and ecological well-being, and urban ecosystem services.

Transformation of former cemetery
Leise Park, Prenzlauer Berg, Berlin

"Human beings need contact with nature and the natural environment. They need it to be healthy, happy, and productive and to lead meaningful lives." (Beatley, 2016, p. 3)

The project revolves around a set of concepts that form the theoretical background of the thesis. To understand the concepts and their relation to each other, the conceptual framework is set up. The concepts are explained in this chapter on the basis of relevant literature.

As guiding themes, the three main topics "People, the Built Environment and Urban Ecology" intersect in the project.

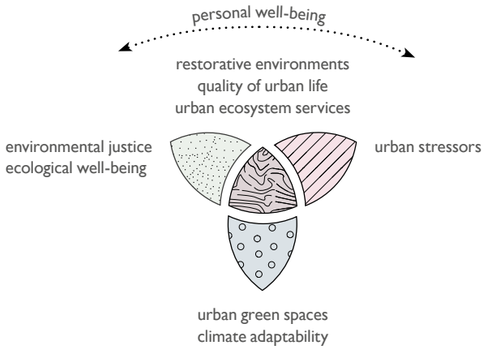



[Fig. 28] Intersection of main themes

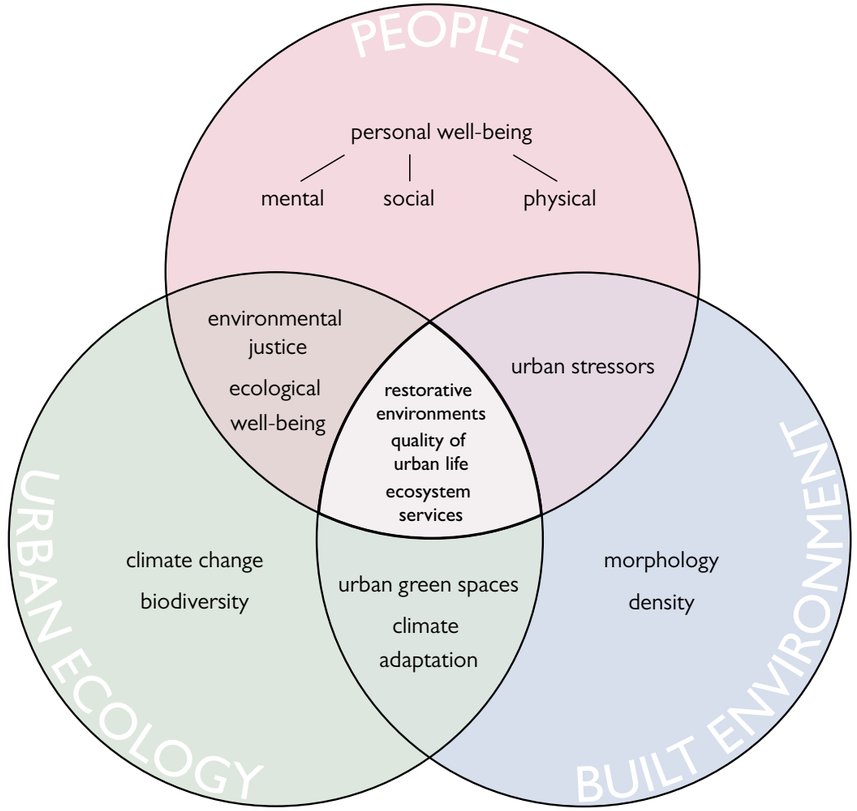
When talking about people, the individual and its personal well-being is in focus but also the relationship with others in the community and the society as a whole play are role. The built environment comprises everything man-made in the urban context. While here many of the challenges originate, it is also the birthplace for arising opportunities for the urbanist to shape the environment accordingly. The third field of Urban Ecology deals with the relationship between human and non-human species and the environment while acknowledging their interdependency within the complex system (Vink, 2014). That is an important aspect of the project as the connection between the urban environment of Berlin and its various inhabitants is highlighted by examining the correlation of human well-being and nature contact.

Within each field different concepts are relevant. Furthermore, there is a strong relation between the three fields. Thus, the overlapping concepts are placed at the intersections and form the core of the project. Central are here the restorative environments, urban ecosystem services, and the quality of urban life as those concepts relate to all three fields.

Being the driving criteria for the development of the design, personal well-being guides the three concepts at the core. By operationalising the concepts in form of design strategies, an assessment of the project can be made later on.



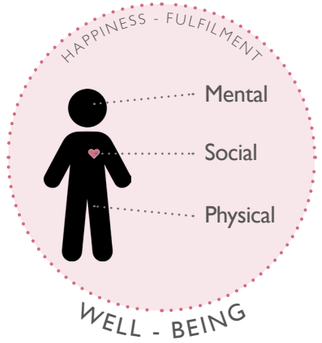

[Fig. 29] Relation of concepts




[Fig. 30] Conceptual framework - relation of people and urban ecology in the built environment

## 2.2 PERSONAL WELL-BEING

Personal well-being is a broad concept that can be defined as a desirable, healthy state of human existence (Musek & Polic, 2014). It encompasses various dimensions of well-being. In this project, the emphasis is placed on mental, physical, and social well-being.




[Fig. 31] Personal well-being

As already illustrated during the problem exploration, urban residents are at a higher risks for stress, mental fatigue, and mental illness. Therefore, the improvement of mental well-being plays an important role in the project. The term will be used interchangeably with mental health which is defined as "a state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community." (WHO, 2005, p.XVIII). For the assessment of mental well-being in the project, the ability to cope with daily urban stressors and the restoration from mental fatigue are put into focus.

> ***Health:***
> "A state of complete physical, mental and social well-being and not merely the absence of disease or infirmity"
> (WHO, 2020, p. 1)

Directly related to the state of mental well-being is physical well-being. It comprises "the ability to perform physical activities and carry out social roles that are not hindered by physical limitations and experiences of bodily pain, and biological health indicators" (Capio et al., 2014, p. 4805).
As the project takes a holistic approach to well-being, the third layer is included by looking at social well-being. Thus, healthy relationships with the social environment are of high importance for personal well-being (Roe & McCay, 2021). Furthermore, social well-being comprises social integration which means to feel like a part of society (Keyes, 1998). Moreover, according to Seligmann (2011), there are additional components to well-being, including hedonic well-being in form of happiness and eudaimonic well-being as finding a purpose in life. The two concepts are kept in mind but not at the foreground in the project.

For the assessment of personal well-being regarding the design strategies, the contribution to general health and the quality and quantity of social interactions are central. Also, since all three dimensions of well-being mutually influence each other, interventions related to one aspect indirectly affect the others likewise.





Quality of life is a multidimensional, subjective concept as its perception and assessment vary by individual and cultural conditions, values, and expectations. Generally, it is understood as "an individual's perception of their position in life" (WHO, n.d.). Thus, quality of life describes the well-being of the individual and societies (Psatha et al., 2011). Here, a distinction between the individual experience of one's life and the living conditions can be made (Jenkinson, 2023).
Specifically, assessing the living conditions in the urban context is covered by the concept of quality of *urban* life (Psatha et al., 2011).
The concept is relevant for the project as a decline of quality of urban life was noted with increasing size of an urban environment (Nuvolati, 2014).

Additionally, personal well-being is linked to quality of life since it highly depends on the living conditions. As urban stressors represent conditions in the urban environment, they are also part of the influencing factors for urban quality of life. Therefore, the assessment of quality of urban life in the project is based on the selected urban stressors. However, the assessment is limited to objective measures as the subjective experience may be differing per person.

The urban environment should be designed in a way that everyone has the possibility to live a qualitative life according to their personal interests.

As the World Health Organisation (2020) states:

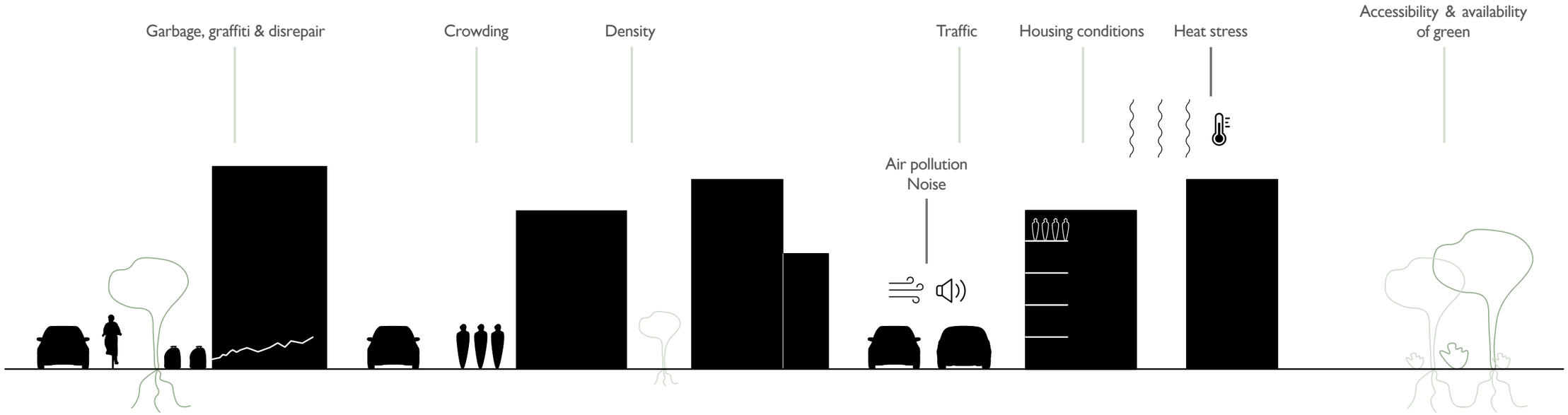
*"Governments have a responsibility for the health of their peoples which can be fulfilled only by the provision of adequate health and social measures." (p.1)*

Nevertheless, the predisposition for quality of urban life in form of adequate and health supporting living conditions in cities is often not given. In light of environmental justice, an unequal spatial distribution of harmful stressors among societal groups was identified in Berlin (Kabisch & Haase, 2014; SenUVK, 2019a). As outlined in chapter 1, the factors noise, air pollution, climatic stress, and insufficient provision of green spaces dominate in socio-economically challenged areas.
Mitigating the negative effects of the named factors supports hence a fair provision of desirable living conditions which results in a higher quality of urban life and better personal well-being.

## URBAN STRESSORS

Various factors in the urban environment influence personal well-being, particularly the stress caused by urban stressors. These stressors refer to "elements, events, or situations in the urban environment" (Koene, 2018, p. 26), which are relevant in this context A selection of relevant stressors for the project is presented below. Despite the focus on accessibility and availability of green spaces, other factors are seen as well since the influence of the urban environment is multilayered. In view of the following design strategies, the impact on other urban stressors through the improvement of urban green spaces is considered.

So lead street trees and other types of vegetation to cooling of the surface radiating temperature which consequently reduces heat stress (Salmond et al, 2016). In turn, morbidity and mortality due to heat decrease (Singh et al., 2020). Additionally, improved air quality and noise reduction through trees result in better sleep and respiratory health and thus positively affect the overall personal well-being.


[Fig. 32] Selected urban stressors (by author, based on Koene, 2018)

## 2.3 RESTORATIVE ENVIRONMENTS

As shown in the first chapter, life in cities negatively impacts humans and nature in several ways. But it would be one-sided to only look at the negative effects while some places and conditions positively contribute to restoration. Restoration in that context can be defined as the "process of recovering physiological, psychological and social resources that have become diminished in efforts to meet the demands of everyday life" (Hartig, 2007, p. 164). These positive changes in emotional, cognitive, and physiological states (Ulrich et al., 1991) are explained by different theories.

According to Ulrich's (1983; see also Ulrich et al., 1991) Stress Reduction Theory (SRT), the environment influences emotional well-being and the recovery of physiological distress. SRT is explaining restoration from an emotional point of view while focusing on the direct response to the visual stimuli of the environment. Consequently, a like-dislike reaction is leading to physiological changes. Stress recovering factors are here complex sceneries and a present focal point.
The second theory by Kaplan and Kaplan (1989) explains restoration from a cognitive viewpoint. The Attention Restoration Theory (ART) states that natural environments contain stimuli that allow effortless attention, so-called involuntary attention, which captures attention while leaving enough space for reflective thinking. As urban environments are often filled with too many stimuli that demand a lot of mental effort and hold the attention directly, no room is left for reflection. Therefore, urban environments are mentally exhausting. However, according to ART, four factors contribute to the restoration of mental fatigue:

- Being away
- Extent
- Fascination
- Compatibility

These four characteristics appear in natural environments in various ways. The feeling of being away is related to being in a different context than usual which allows different thoughts. Especially in cities it is therefore important to find accessible nature within short distances to experience a change of environment. Already the view out of the window into a natural setting can evoke that sensation (Kaplan et al., 1998). The next characteristic, extent, is linked to that as well by creating the feeling of being in a different world. The extent is determined by the scope and connectedness of the place. Even small places can provide the feeling of a greater extent based on the design for example by the arrangement of paths (Kaplan, 1992).
Furthermore, fascination is linked to involuntary attention and can be caused by an object in the environment or by actions performed there. In natural environments, different vegetation and natural processes like wind often cause "soft fascination" (Kaplan, 1992, p. 139). The last aspect, compatibility, is understood as the support of one's desired actions by the settings of the environment. In natural settings, the compatibility is often already experienced high.

Also, more recent research has been done on restorative environments. So explain Roe and McCay that "a restorative environment is any setting that helps us regulate our emotions and recover from mental fatigue, stress and the demands of everyday life" (2021, p. 10). Next to the mentioned characteristics by the precedent theories (natural settings, stress recovery, involuntary attention, and mental space for reflection), they highlight the importance of occasional encounters for restoration. Linked to that, collective restoration can be mentioned (Hartig et al., 2013). That theory states that restorative benefits can spread among people regardless if they are mutually known or from occasional encounters. Even though the theory was until now only studied under the conditions of vacation, improving opportunities for occasional encounters should be considered in the view of restoration and for tackling loneliness (Roe & McCay, 2021).
Furthermore, Roe & McCay (2021) developed guidelines for restorative Urbanism which provide input for the design of restorative environments.


[Fig. 33] Restorative Urbanism (by author, based on Roe & McCay, 2021)

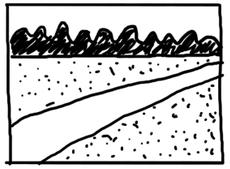
As described, natural environments offer restorative functions based on their specific characteristics. However, not every natural setting fulfils the requirements to be restorative. At the core of people's needs are two elements that influence the quality of every environment: understanding and exploration (Kaplan et al., 1998). Understanding a place provides security, whereas incomprehension causes stress. Additionally, people are constantly in search for information and the expansion of their horizon by exploring their environment.

Kaplan et al. (1998) conducted a study to understand which and why natural environments are favored differently. They found that "large expanses of undifferentiated landcovers" (p. 11) and dense vegetation are low in preference. On the other hand, "spaced trees and smooth ground" (p.12) were preferred. An explanation provides the preference matrix:

| Understanding | Exploration |
|---|---|
| Coherence | Compatibility |
| Legibility | Mystery |

[Fig. 34] Preference Matrix (Kaplan et al., 1998)

Coherence and legibility are given when the environment contains enough information to enable understanding and orientation. Thus, it is well-organised and holds distinctive elements. A variety of elements for discovery and exploration foster complexity and mystery.



Nothing to explore

[Fig. 35] Large expanses of undifferentiated landcover (by author, based on Kaplan et al., 1998)

Confusion

[Fig. 36] Dense vegetation (by author, based on Kaplan et al., 1998)

Orientation & inviting

[Fig. 37] Spaced trees and smooth ground (by author, based on Kaplan et al., 1998)

Less preferred — NO FOCAL POINT

Preferred — FOCAL POINT

Next to ART and SRT, a third theory is worth mentioning as it explains very well the reasoning behind the human attraction to nature. The biophilia theory by Wilson (1984) states that the human-nature connection is based on a genetic predisposition resulting from the evolutionary process of evolving with nature. He argues that we as humans feel innatetely connected to living organisms, thus the connection to nature is an integral part of us.



[Fig. 38] High coherence vs. low coherence (Kaplan et al., 1998)

[Fig. 39] High complexity yet coherent (Kaplan et al., 1998)

[Fig. 40] High distinctiveness vs. low distinctiveness (Kaplan et al., 1998)

[Fig. 41] Mystery can be a curving path (Kaplan et al., 1998)

Nowadays, this connection often got lost in urban settings. Nonetheless, there are various possibilities to reconnect with nature in cities and to consequently find ways for restoration. Urban nature appears in many forms and sizes and so are its restorative qualities differing as well. But firstly, urban nature and the difference to urban green spaces are explained. In the project, however, both terms are used interchangeably.

Urban green spaces (UGS) are considered as any urban land that includes vegetation of all kinds, size, and function on private and public grounds. It is part of green infrastructure and can contain components of blue infrastructure in form of water elements as well (WHO, 2017). In the project, urban green space ranges from large to small scale structures, including urban forests, parks, waterfronts, cemeteries, playgrounds, allotment gardens, private and community gardens, streetscapes, front- and backyards, rooftops, balconies, facades, and planters. For the implementation strategy of the design it is necessary to consider the ownership of the UGS but for now also private land is included for possible design interventions.

Urban nature on the other hand, comprises the listed anthropogenic urban green spaces but goes beyond that by including spontaneous non-designed green in form of wilderness (Breuste, 2020). For the project it is important to note that urban green spaces are like urban nature understood as the entirety of the natural system in the urban context, including all living organisms.

[Fig. 42] Variety of urban green spaces

"A biophilic life may be made up of many small, but potent, doses of nature."

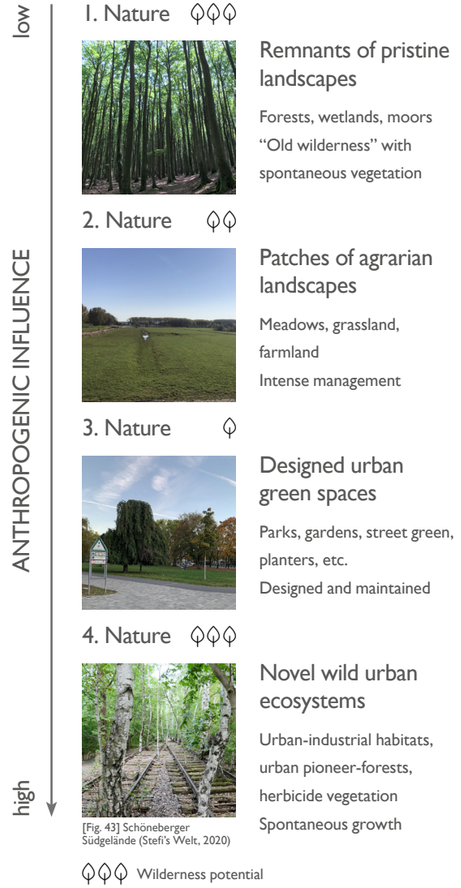
(Beatley, 2014, p. 36)

According to the four natures theory by Kowarik (1992) urban nature can be divided into four categories based on the degree of anthropogenic influence on the natural areas. However, the four types of nature are acknowledged to different degrees by urban residents. Especially the forth type is often not seen as "real nature" yet it holds high potential in terms of biodiversity and the provision of ecosystem services (Kowarik, 2021). Nevertheless, since the 1980s, novel urban wilderness is becoming part of the green infrastructure in combination with design interventions in pioneer projects in Germany (Kowarik, 2021). The potential of urban wilderness also lies in its multiscalarity which makes it interesting for the design strategies within the graduation project.

Furthermore, the case study location of Berlin is characterised by a particularity that is the result of the political situation after the Second World War. Due to a high amount of vacant lots ("Brachen") and unused rail tracks, the variety of native and non-native species is exceptional high (Kowarik, 1992). Consequently, the Berlin School of Ecology was founded and until today, novel wild urban ecosystems and other urban green spaces in Berlin provide high degrees of biodiversity (Popkin, 2022).

The concept of biodiversity consists of three aspects: diversity of genes, diversity of species, and diversity of ecosystems (Vink et al., 2014). Besides natural processes, also results of human influence are part of biodiversity in the urban context including cultivated and non-native plants (Breuste, 2020).

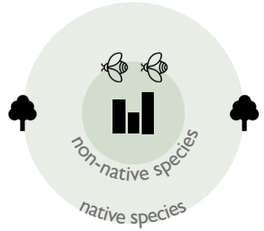





[Fig. 43] Schöneberger Südgelände (Stefi's Welt, 2020)

[Fig. 44] Four types of nature (by author, adapted from Kowarik, 2018)

It is interesting to see that the diversity of species is higher in cities than in the surrounding countryside (Haeupler, 1974 as stated in Kowarik 1992). Due to the heterogenity of the urban environment, species find more niches here that fit their different needs (Sukopp, 1981, as stated in Kowarik, 1992). According to the urban-rural-gradient, more native species occur at the edge of the city where the anthropogenic influence is lower. With rising human activity towards the centre, more non-native species can be found.




[Fig. 45] Diversity of species according to urban-rural-gradient (by author, based on Kowarik, 1992)

Furthermore, research showed that species-rich urban green spaces are highly appreciated by urban residents from different socio-cultural backgrounds (Fischer & Kowarik, 2018a). Ranging from parks, wastelands to streetscapes, all environments were favored in case of higher biodiversity (Fischer & Kowarik, 2018b). That is a very interesting finding as it supports the development of diverse urban nature that promotes the preferences of residents while tackling biodiversity loss likewise. Linking to restorative environments, diverse urban green spaces may offer more potential for fascination and mystery and thus hold opportunities for restoration.

## 2.4 URBAN ECOSYSTEM SERVICES

Urban nature has various positive impacts on humans and the urban climate. However, its value is often overlooked. By adding an economic dimension to the value of nature, awareness among various interest groups can rise (Naturkapital Deutschland, 2016). A way to measure the qualitative, quantitative, and monetary value of the impacts of nature is provided by the concept of ecosystem services.

Ecosystem services are the direct and indirect benefits for human well-being provided by the environment (Brusseau, 2019; Millenium Ecosystem Assessment, 2005). Specifically, urban ecosystem services take place at the intersection of urban nature and the well-being of urban residents (Naturkapital Deutschland, 2016). They can be divided into four categories: provisioning, regulating, cultural, and supporting.

*Supporting:*
Forms the basis for all the other ecosystem services
Includes: Nutrient cycle, soil formation

*Regulating:*
Contributes to the environmental quality in cities
Includes: Climate regulation, quality of air and water

*Provisioning:*
Material and energy resources obtained by ecosystems
Includes: Food, fresh water, wood

*Cultural:*
Non-material benefits for well-being
Includes: Recreation, education, spiritual & aesthetic benefits

Additionally, biodiversity has a special position within the concept. At times it is seen as a ecosystem service on its own. (Naturkapital Deutschland, 2016). Moreover, biodiversity fulfils a regulating role in all processes of ecosystem services while also being a measure for valuation (Mace et al., 2012). Fostering urban ecosystem services improves biodiversity and the quality of life likewise and is thus a goal for sustainable urban development and healthy life (Naturkapital Deutschland, 2016).

It is important to note that for the project the economic aspect is less in foreground as the qualitative contribution of urban ecosystem services to personal well-being predominates. However, the ecosystem services should fulfil the following criteria:

- Urban: provided within urban context
- Overall health: promotes stress reduction and physical activity
- Social interaction: enables encounter and exchange
- Contribution to biodiversity and climate adaptation



### ECOLOGICAL WELL-BEING & CLIMATE ADAPTATION

Urban ecosystem services foster personal well-being, yet the positive impacts on the natural environment go hand in hand. Given the integrated approach of the project, ecological well-being receives attention as well. As the "wellness of the ecological system", ecological well-being "refers to the harmonious relationship between people and their ecological system, which leads to a successful management, distribution, and sustainability of environmental resources for current and future generations." (Grouzet & Lee, 2014, p. 1).

The state of the environment and humans have a strong relationship since quality of life and human well-being depend on the wellness of the ecological system. Vice versa, the human impact strongly affects the environment. Thus, rapid climate change is man-made but the consequences influence the entirety of ecosystems. Taking measures to mitigate the causes as well as adapting to the consequences of climate change are consequently necessary challenges to ensure healthy lifes.

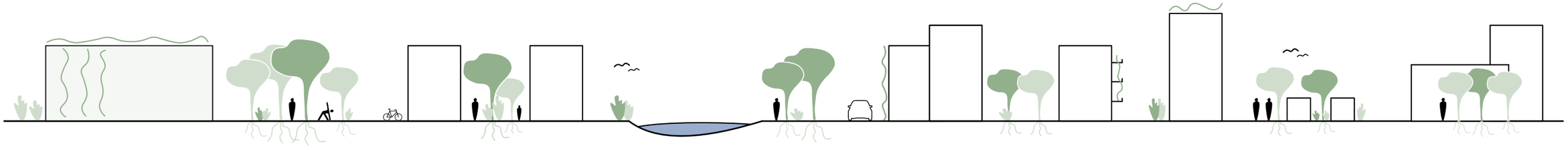
In the project, attention is given to design strategies that foster not only human but also ecological well-being. Assessing the health and resilience of an ecosystem can be done by measuring the degree of biodiversity (Vink, 2014). Evaluating the species richness and relative number of species would extent the capacities of the project. However, the contribution to biodiversity is considered in all design ideas to support resilient ecosystems.

Personal
WELL-BEING
Ecological

PROVISIONING

Food
Fresh water

HEALTH - SOCIAL INTERACTION



BIODIVERSITY - CLIMATE ADAPTATION

CULTURAL

Physical activity
Recreation
Encounters
Education
Aesthetics

REGULATING

Cooling
Clean air & water
Noise reduction
Water retention & infiltration

[Fig. 46] Ecosystem Services (by author, based on Millenium Ecosystem Assessment, 2005

## 2.5 CONCLUSION - HUMAN-NATURE RELATIONSHIP

This chapter delved into the underlying theoretical concepts of the thesis. At the heart of the conceptual framework lies the relationship between humans, urban ecology, and the built environment. Understanding these connections is crucial as personal and ecological well-being in the urban context are strongly intertwined.

Furthermore, the chapter explained the meaning of personal well-being and its association with the quality of urban life. Personal well-being comprises multiple dimensions, including mental, physical, and social aspects. The well-being and quality of life depend on various factors, including urban stressors. Therefore, the theory chapter illustrated the different stressors that occur in the built environment.

To bridge the gap between humans and nature, three theories regarding restorative environments were presented: the Stress Reduction Theory (SRT; Ullrich et al., 1991), the Attention Restoration Theory (ART; Kaplan & Kaplan, 1989), and the Biophilia Theory (Wilson, 1984). Moreover, ideas of the restorative urbanism theory by Roe & McCay (2021) were introduced. These theories serve as the foundation for understanding and creating restorative environments in the urban context. Additionally, the chapter explained the different types of urban nature since natural environments are an integral part of restorative environments. This led to the final part of the theory chapter, which explored ecosystem services and climate adaptation as essential components of ecological and personal well-being.

Ultimately, the key message is that each layer is interconnected. Interventions that enhance the natural system also contribute to the personal well-being of humans. Conversely, the consequences of man-made problems disrupt ecological well-being and, consequently, the overall quality of urban life.

# CHAPTER 3

## RESTORATION WITH URBAN NATURE

The development of a pattern language is displayed in the third chapter. It is shown how the patterns that form the basis for the restorative design strategies relate to each other within a patternfield. Furthermore, the assessment of the patterns is carried out based on chosen parameters.

Pot and Planters
Prenzlauer Berg, Berlin

"A healthy city is not one that has achieved a particular health status. It is conscious of health and striving to improve it." (WHO, 2023)

# 3.1 INTRODUCTION OF A PATTERN LANGUAGE

A pattern language is a collection of design ideas, combining theory and praxis, which can be applied to specific contexts. Christopher Alexander first introduced this method in 1977 to offer practical solutions in the form of patterns for reoccurring environmental problems. Patterns serve as concise and multifaceted tools for breaking down complex issues into tangible solutions. Additionally, patterns are interconnected and only function within a network.

As part of the graduation project, the pattern language 'Restoration with Urban Nature' was developed. It contains patterns aimed at facilitating the creation of restorative environments in Berlin. This pattern language serves as a guide for the design strategies and guidelines in the subsequent research phase. Furthermore, it acts as an analysis and communication tool during co-creation workshops with stakeholders in Berlin.

Primarily, a pattern language acts as a bridge between theory and practical implementation. The connection between the project's main theories and the 'Restoration with Urban Nature' pattern language influences the selection of pattern categories and assessment criteria. Since the thesis focuses on people, urban ecology, and the built environment, all patterns in the language revolve around these topics to varying degrees. Overall, the patterns contribute to restoration and urban nature, positively impacting personal and ecological well-being. They are specifically designed for the context of the built environment in Berlin, but their applicability extends to other urban contexts as well.

To enhance usability, the patterns are organised into six categories: 'General,' 'Activity,' 'Senses,' 'Environment,' 'Implementation,' and 'Bonus.' The categories of activity, senses, and environment are derived from the theories explained in the previous chapter. Physical and mental activity, crucial for personal well-being, constitute a category on their own. Additionally, physical activity is considered part of cultural ecosystem services. The 'Senses' category emphasises activating different senses to enhance well-being, drawing from the concept of restorative urbanism (Roe & McCay, 2021). Moreover, the natural settings of restorative environments (Kaplan & Kaplan, 1989) promote involuntary attention and stress reduction. The 'Environment' category addresses issues related to climate adaptation, ecological well-being, ecosystem services, and biodiversity.

Furthermore, each pattern is evaluated based on its performance in terms of restoration, activity, environment, involvement of different stakeholders, and the temporal dimension. The assessment criteria for each parameter are based on the relevant theoretical backgrounds.

For example, the 'Environment' assessment criteria encompass topics such as heat stress reduction, unsealing, and rainwater infiltration to address climate adaptation.

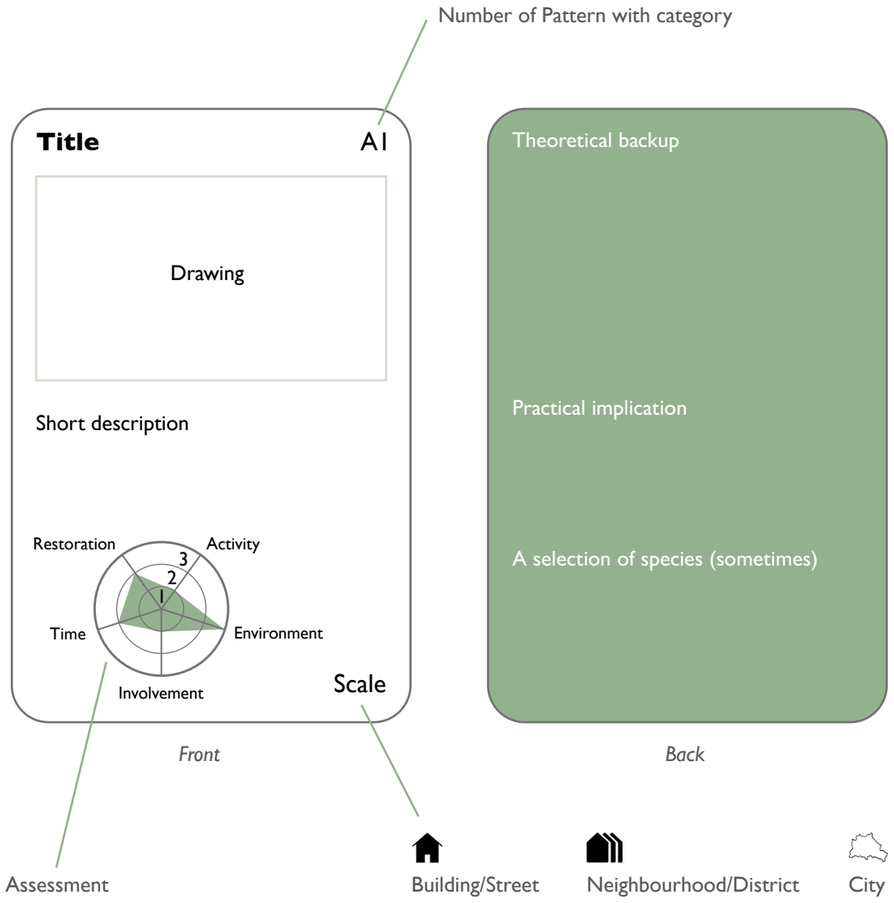
To access a comprehensive overview of the pattern language, all patterns are compiled in a pattern atlas, which can be accessed via the link provided in figure 47.


[Fig. 47] Pattern Atlas

## ORGANISATION OF PATTERN CARDS

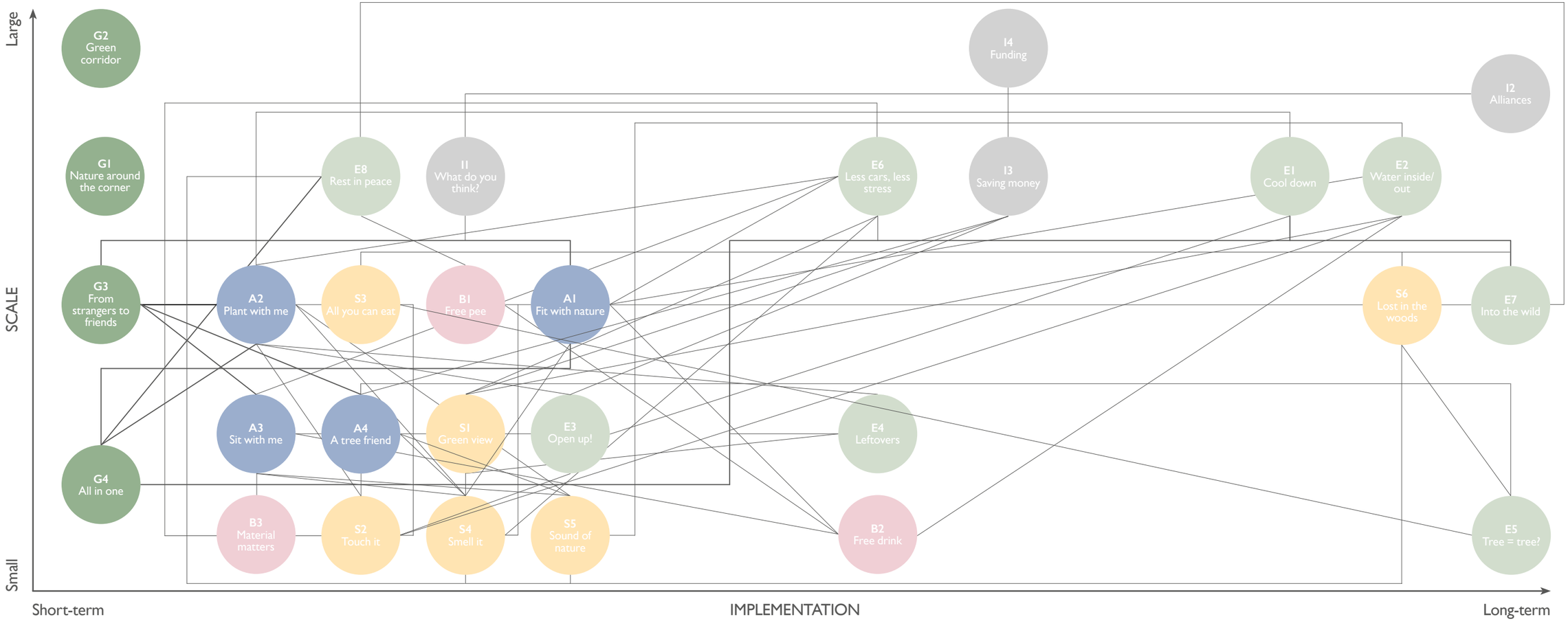
Each pattern is organised in the form of a pattern card, resembling a playing card. This format allows for easy use during discussions with stakeholders, presenting the main information on the front side and providing more detailed descriptions on the back



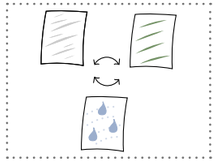


## 3.2 RELATION OF PATTERNS IN PATTERNFIELD

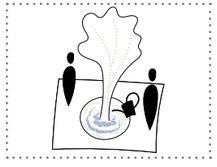
The patternfield illustrates the relation of the patterns to each other. They are organised by scale and implementation time. Some patterns are more general and include other, more specific patterns. Related patterns can be applied together but also function individually. The first two patterns "Nature around the corner" and "Green corridor" are superordinate and show connections to all other patterns. For better readability, their connections are not shown in the patternfield. Also, the implementation patterns are more general and relate to several patterns.

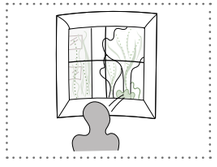


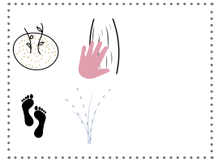
## ORGANISATION BY SCALE AND TIME

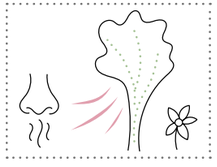

All in one (G4)

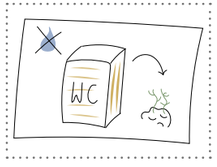

Sit with me (A3)


A tree friend (A4)

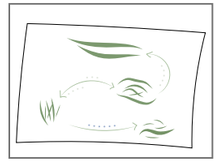

Green view (S1)


Touch it (S2)

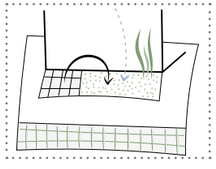

Smell it (S4)

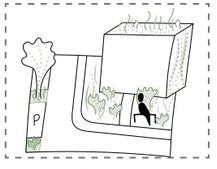


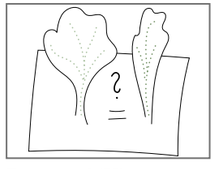
Free pee (B1)


Green corridor (G2)

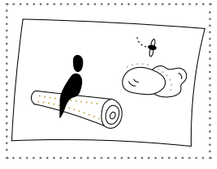

Sound of nature (S5)

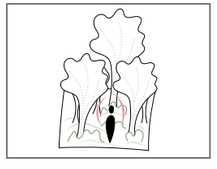

Open up! (E3)

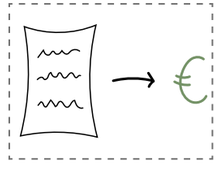

Leftovers (E4)


Tree = tree? (E5)

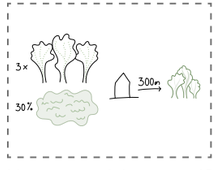

Free drink (B2)


Materials matter (B3)

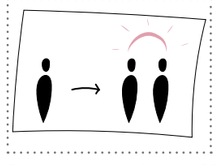

Lost in the woods (S6)


Funding (I4)

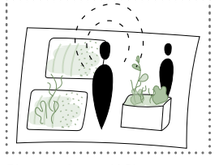


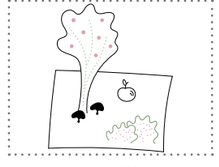


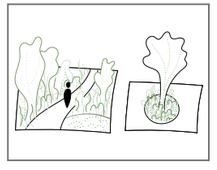
Nature around the corner (G1)


From strangers to friends (G3)

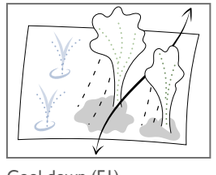

Fit with nature (A1)

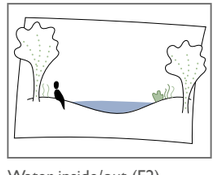

Plant with me (A2)

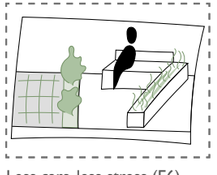

All you can eat (S3)

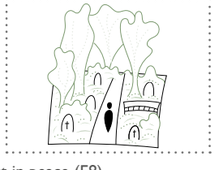

Into the wild (E7)

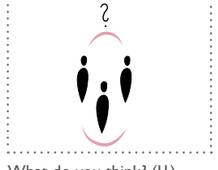
0-2 years
2-5 years
5-10 years


Cool down (E1)

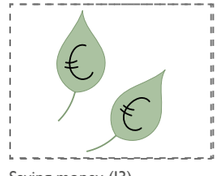

Water inside/out (E2)


Less cars, less stress (E6)


Rest in peace (E8)


What do you think? (I1)


Alliances (I2)


Saving money (I3)

## 3.3 PATTERNS BY TOPIC

The patterns are organised into six categories. In contrast to the previous organisation based on scale and time, this page provides an overview of all patterns within their respective categories. The visualisation on the following page (see Fig. 48) demonstrates how various patterns can be applied to create an environment that fosters restoration with urban nature across different scales.

### Categorie 1: GENERAL

- G1 Nature around the corner
- G2 Green corridor
- G3 From strangers to friends
- G4 All in one

### Categorie 2: ACTIVITY

- A1 Fit with nature
- A2 Plant with me
- A3 Sit with me
- A4 A tree friend

### Categorie 3: SENSES

- S1 Green view
- S2 Touch it
- S3 All you can eat
- S4 Smell it
- S5 Sound of nature
- S6 Lost in the woods

### Categorie 4: ENVIRONMENT

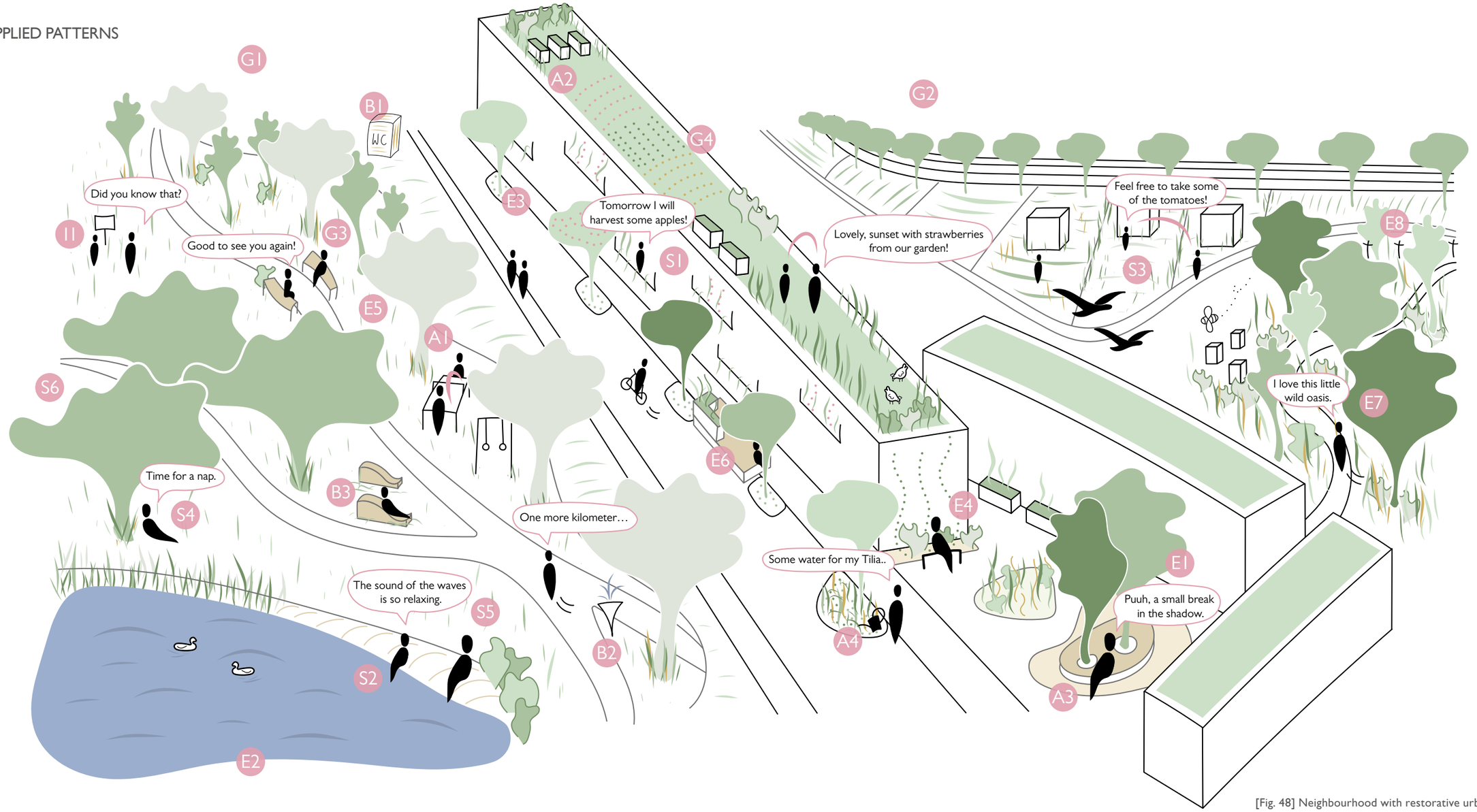
- E1 Cool down
- E2 Water inside/out
- E3 Open up!
- E4 Leftovers
- E5 Tree = tree?
- E6 Less cars, less stress
- E7 Into the wild

### Categorie 5: IMPLEMENTATION

- I1 What do you think?
- I2 Alliances
- I3 Saving money
- I4 Funding

### Categorie 6: BONUS

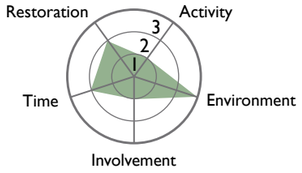
- B1 Free pee
- B2 Free drink
- B3 Material matters




[Fig. 48] Neighbourhood with restorative urban nature

# 3.4 ASSESSMENT

The assessment of the patterns was developed based on literature review on restorative environments, personal and ecological well-being, and ecosystem services. Moreover, the comparison with related projects and educated guesses gave further input.
The assessment is intended to help the user understand the performance of a pattern in the fields of restoration, activity, and environment. Furthermore, it gives an understanding of the estimated time and the degree of state support that is needed for the realisation of an intervention.




[Fig. 49] Pattern assessment



## FIELDS OF ASSESSMENT

**Restoration:**
*Criteria: extent, fascination, compatibility, being away, coherence, senses*

1. Low impact: 0-2 criteria fulfilled
2. Medium impact: 2-3 criteria fulfilled
3. High impact: all criteria fulfilled

**Activity:**
*Includes encounter & physical activity*

1. Low impact: no or slow activity/ happening (completely resting), almost no interaction
2. Medium: activities possible, some interaction happening
3. High: practising sports, high amount of opportunities for social interaction

**Environment:**
*Tackles stressors like noise/air pollution, urban heat island effect, and biodiversity*

1. Low impact: only little contribution to cooling, stressor reduction, no/little diversity of species/ecosystems
2. Medium: partly noise buffer, less emissions, medium variety of species/ecosystems, noticeable cooling effect
3. High: high reduction in noise, improvement of air quality, attracting other species and connection of ecosystems, high cooling effect

**Involvement:**
*Private - public responsibility*

1. Single person or private groups
2. Support by organisations or state
3. Completely statale

**Time (in years)**

1. 0-1
2. 2- 5
3. 5-10

## 3.5 CONCLUSION - A PATTERN LANGUAGE

In the third chapter, the pattern language "Restoration with urban nature" was introduced. The chapter explained the structure of the pattern language and the patterns itself. Furthermore, it gave an overview for a potential application of the patterns. The separate pattern atlas provides the complete collection of the patterns and can be accessed via the QR code (see Fig. 47).

Since a pattern language steers the design process and acts as an analysis and communication tool, it provided guidance for the analysis and design sections that follow in chapter four and five. Especially, during the co-creation workshop that will be explained in chapter five, the pattern language played an important role as mediator.

# CHAPTER 4

## ANALYSING BERLIN

In the fourth chapter, the case study location Berlin is presented. Firstly, spatial and policies analysis are done on the metropolitan scale to subsequently narrow down into focus areas. Here, the results of the fieldwork are shown and evaluated.

Disrepair of the public space
Charlottenburger Verbindungskanal, Berlin

"Green space in cities shouldn't be considered an optional luxury. [...] it is a crucial part of a healthy human habitat. Daily exposure is essential." (Montgomery, 2015, p.122)

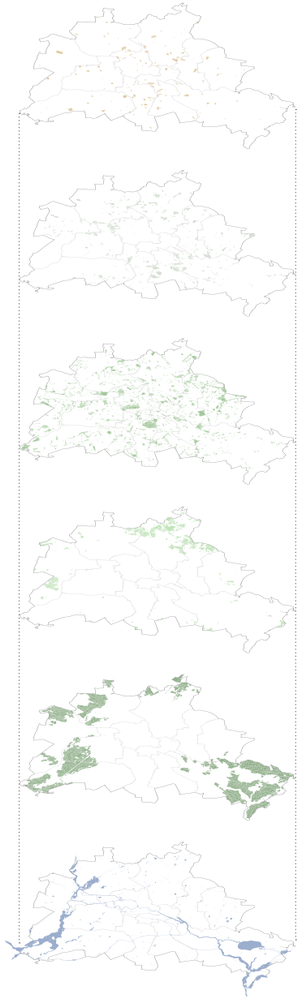

[Fig. 50] Green-blue infrastructure



[Fig. 51] Green-blue regional structures with nature reserves in Brandenburg







*Cemeteries*
1.100 ha, 220 in total, 38 closed (Geoportal Berlin)

*Allotment gardens*
2.800 ha, 74.000 gardens (SenSU, 2014a)

*Parks, sport fields and other green spaces*
6.700 ha, > 2.500 parks (SenSU, 2014a)

*Agriculture and grasslands*
3.500 ha

*Forests*
15.700 ha

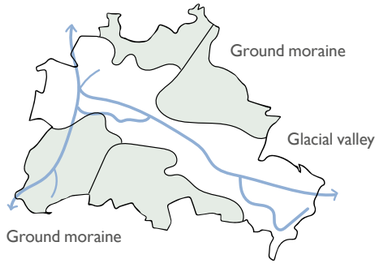
*Water*
5.800 ha

[Fig. 52] Spatial composition (by author, based on Geoportal Berlin)

Understanding the existing characteristics of the wider green-blue network is essential for assessing the problems and opportunities regarding the development of design strategies and guidelines. Therefore, the following section is dedicated to the fourth research question:

*What is the status quo of urban green spaces in Berlin regarding their quality, quantity, and accessibility?*

Historically, the development of Berlin's geological structure is based on the last glacial era, which formed the Warsaw-Berlin glacial valley (Warschau-Berliner Urstromtal). The valley is leading from southeast to northwest, following the course of the river Spree, and is surrounded by ground moraine formations (Umweltatlas Berlin, 2017). The characteristic tripartition shapes the soil conditions and forms the basis for the current green-blue structure of the city.




[Fig. 53] Geological development (by author, adapted from SenUMVK, 2008)

The variety of the green-blue infrastructure in Berlin is illustrated in figure 52. Around 40-44% of the total land area consists of urban green spaces, making Berlin a relatively green city in the European comparison (Fleck, 2022). While urban forest structures and agricultural land are located along the edges of the city, various urban green spaces in form of parks, allotment gardens, and cemeteries are found in the city centre and hold potential for the provision of restorative environments close-by.

But as mentioned already in chapter 1.2, the distribution and accessibility of the green-blue infrastructure are unequal within the city, leaving 20 % of Berlin's residents without access to sufficient UGS close to their homes (Coppel & Wüstemann, 2017).
The biggest urban parks in Berlin are Tempelhofer Feld (300 ha) and Tiergarten (210 ha). As a former airport, the Tempelhofer Feld is characterised by large open areas and grasslands where next to different leisure possibilities, also high biodiversity and shelter for various species occur.

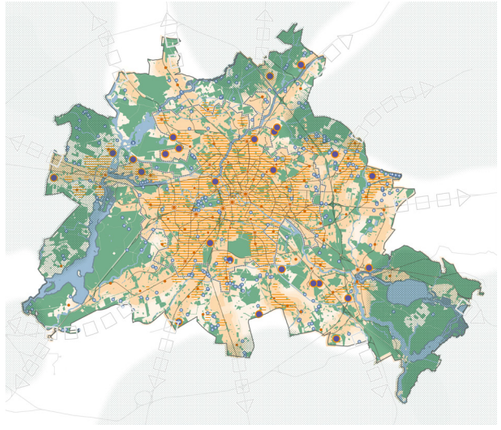
Like many cities, also Berlin is affected by the consequences of climate change, which results in heat stress during warm summer periods and droughts. That leads to health-affecting risks, so 5% of deaths between 2001 and 2010 were related to higher air temperature, affecting especially the age group 65+ (Scherer et al., 2014).
Furthermore, the health of Berlin's inner city trees is suffering with a share of almost 57% damaged street trees in 2020, showing a decline in vitality compared to 2015 (SenUVK, 2021).
The four prevalent street tree species are lime tree (Tilia), maple (Acer), chestnut (Aesculus hippocastanum) and plane tree (Platanus) whereas lime trees show the least damage and chestnuts are affected the most (SenUVK, 2021). The climatic development is important to consider for the choice of trees when designing restorative environments as a shift to more drought-withstanding species is needed.

# 4.2 POLICY ANALYSIS - CURRENT PLANS FOR BERLIN

The city of Berlin is aware of the importance of climate action, thus several programs with specific measures for different action fields were published in the past years. The main goal of the city is to reach climate neutrality by 2045 and to reduce 70% of the CO2 emissions until 2030 (SenUMVK, n.d.). To fulfil these goals and to enable healthy living conditions while adapting to the consequences of climate change, the "Berliner Energie- und Klimaschutzprogramm 2030" (program for energy and climate protection) and the Urban Development Plan "SteP Klima 2.0" have been developed.

The program for energy and climate protection came into effect in 2018 and contains specific measures for various areas of climate protection and adaptation (SenUVK, 2019b). It is divided into different action areas, each of which first presents the challenges, then the goals and strategies, and finally concrete measures.

The Urban Development Plan "Klima 2.0" has been in effect since December 2022 and is a continuation of the Urban Development Plan "Klima Konkret", which has deepened the Urban Development Plan "Klima" (2011) and provides practical guidance since 2016 (SenSBW, 2022; SenSU, 2016). The "Klima 2.0" plan makes spatial and urban planning statements for the entire city to provide recommendations and measures for climate adaptation through five action approaches. The plan focuses on climate-protecting growth of the city in the face of climate change and the preservation of quality of life. It also includes statements about green-blue measures for cooling the city as well as relief and potential spaces.



[Fig. 54] Urban Development Plan Klima 2.0 - Spatial vision (SenSBW, 2021)



Since 2011, the potential of the green city has also been secured and promoted with another instrument, the City Landscape Strategy "Strategie Stadtlandschaft" (SenSU, 2014a). The three main themes here are "Beautiful City," "Urban Nature," and "Productive Landscape." Concrete programs of the strategy include the green area renovation program, the mixed forest program, nature experience spaces for children, and the city tree campaign.

Also dedicated to urban greenery is the Berlin Charter of Urban Nature "Charta Berliner Stadtgrün" as a commitment by the state of Berlin to the preservation and maintenance of urban nature, also with regard to environmental justice (SenUVK, 2020a). The commitment is supplemented by the Berlin Urban Nature Action Program 2030 "Handlungsprogramm Berliner Stadtgrün" with concrete projects (SenUVK, 2020b).

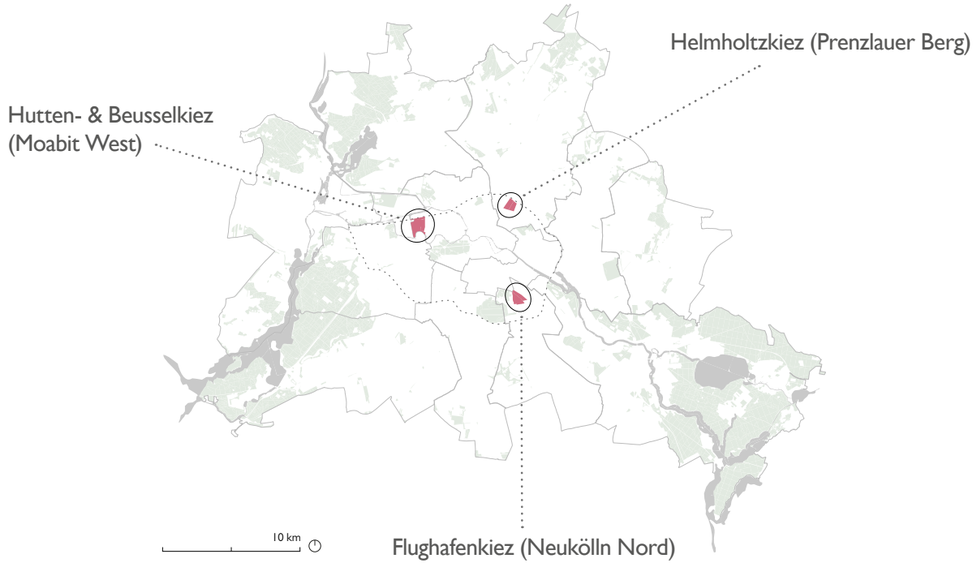
Moreover, the Landscape Program including the Species Protection Program (LaPro) is available since 1994 as an important planning basis for the development of green spaces in Berlin, supplementing the current land use plan. (SenUVK, 2017) LaPro encompasses four themes: natural systems/environmental protection, biotopes/species protection, landscape image, and recreation/public space use.

Furthermore, the city of Berlin recognises the importance of biodiversity and adopted the Biodiversity Strategy in 2012. This places a stronger focus on safeguarding and promoting biodiversity in the city. (SenSU, 2012) The strategy considers four thematic areas: species/living environments, genetic diversity, urban diversity, and society.

For the Moabit West area, the Green Moabit neighbourhood development concept was developed in 2013 (SenSU, 2014b). The goal is to provide strategies and measures for a climate-adapted and climate-protected neighbourhood. The focus lies on the topics of heat and heavy rainfall events, as well as climate adaptive ideas for a strongly industrialised area. In addition, the Moabit West Business Network working group has formed, representing the companies in Moabit West.

To conclude, there are several instruments available to stear the development of Berlin's green spaces as well as fostering measures for climate protection and adaptation. These projects and measures consider the health of the citizens, yet the fcous could be emphasised within the goals of the programs. So is the main relation between climate change and health the often mentioned effect of heat stress or pollen (see SenUVK, 2019b), whereas other factors of personal well-being and specifically mental health remain underrepresented.

# 4.3 FOCUS AREAS



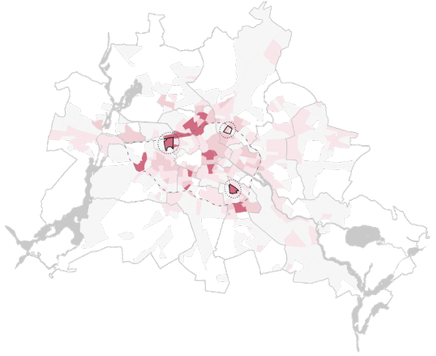

[Fig. 55] Focus areas

Three focus areas were chosen to test and apply the design and strategy. The areas are located in the inner-city districts and are characterised by high population densities, a lack of accessible urban green spaces, and environmental unjust conditions due to raised pressure from urban stressors. The different compositions of the inhabitants regarding socio-economic factors as well as varying structures in the built and natural environment allow for interesting comparisons.

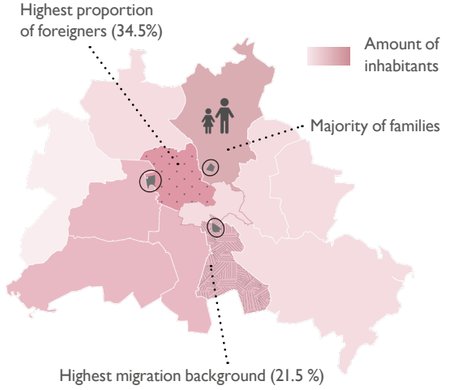
The following section explores the characteristics of the areas based on spatial analysis and impressions from the field trip.



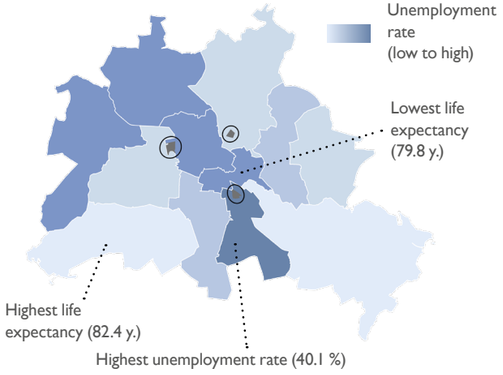
## CHARACTERISTICS



[Fig. 56] Environmental justice with focus areas, 2021 (by author, based on Amt für Statistik Berlin-Brandenburg, 2021b)



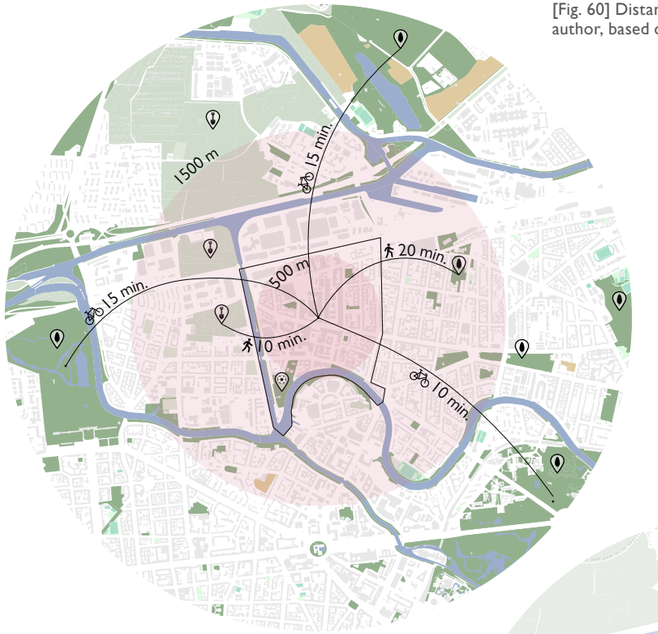

[Fig. 57] Socio-cultural background, 2021 (by author, based on Amt für Statistik Berlin-Brandenburg, 2021c)




[Fig. 58] Unemployment, 2021 (by author, based on SenWGPG, 2022)


[Fig. 59] Distances to green infrastructure on city scale (by author, based on Google Maps, 2023)

[Fig. 60] Distances to green infrastructure on district scale (by author, based on Google Maps)





Public water pumps
Drinking fountains
Defect water pumps
WC Public toilets (with fee)

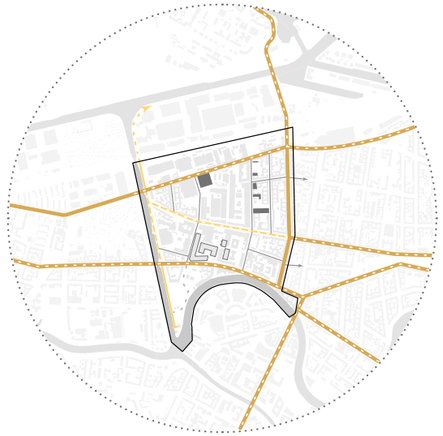
[Fig. 61] Green-blue infrastructure on neighbourhood scale (by author, based on Open Street Maps, 2023)

Land use

- Residential
- Industrial
- Social
- Commercial use on ground floor

1. Heinrich-von-Stephan-Gemeinschaftsschule (School)
2. Schlupfwinkel (Youth club)
3. Jugendhaus B8 (Youth club)
4. District management
5. Stadtschloss Moabit (Neighbourhood center)
6. Youth Migration Service - CJD
7. ZK/U & Urban Gardening (Center for Art and Urbanism)
8. Bethania Diakonie gGmbH
9. Waldstraße
10. Offenes Wohnzimmer (Neighbourhood meeting place)
11. Psychosoziale Initiative Moabit e.V. (Psychosocial initiative)
12. Siemens Energy AG

[Fig. 62] Institutions/ land use

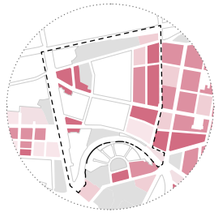


- Main streets
- Transit streets
- Residential streets
- Cycling lanes
- Parking

[Fig. 63] Traffic

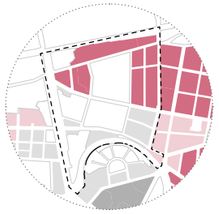


[Fig. 64] Satellite view



- 1 > 550 in/ha

[Fig. 65] Population density



- Not or poorly supplied ≤ 0,1 - 3
- Undersupplied < 6 - 3
- Supplied > 6

[Fig. 66] Provision of UGS m²/in

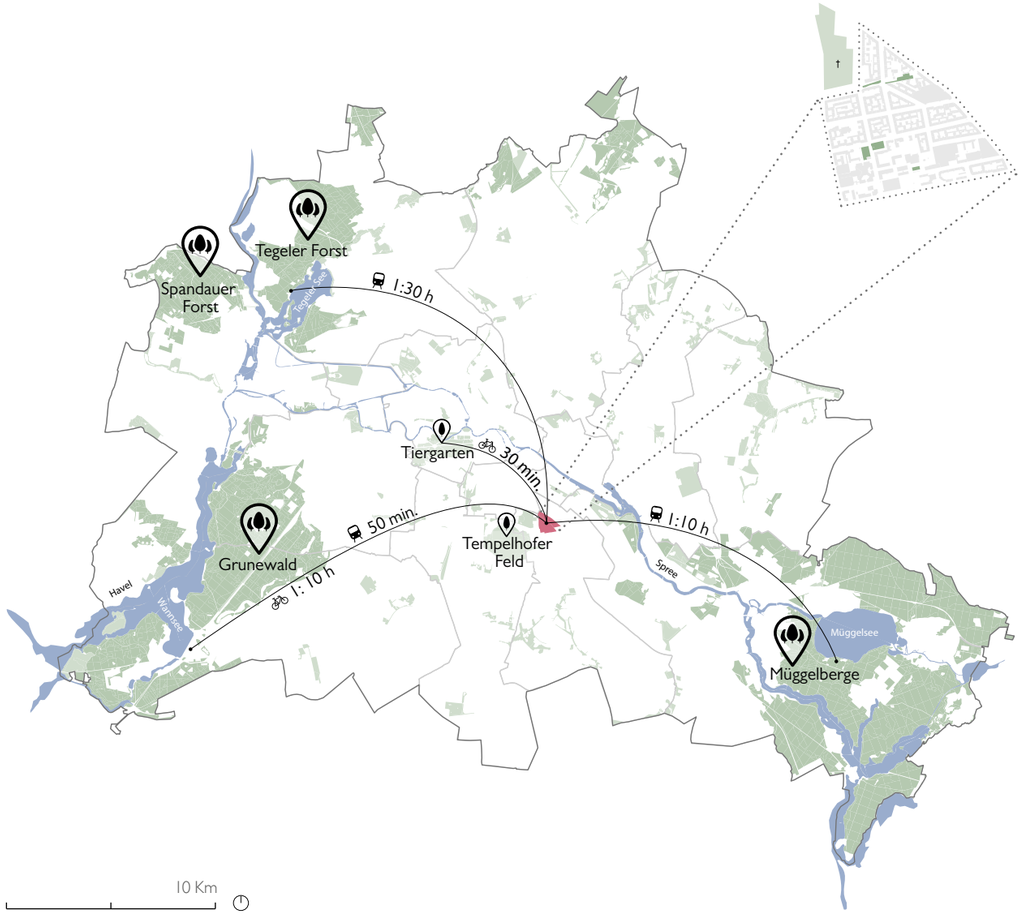
- > 5 - 60%
- 60 - 70%
- 70 - 80%
- 80 - 90%
- 90 - 100%

500 m

[Fig. 67] Amount of sealed surface

Moabit West is located in the central district "Mitte" and is characterised by a highly mixed land-use, consisting of residential areas on the eastern and western sides and large industrial areas in the center and northern side. The surface area comprises approximately 76 ha with 10,316 inhabitants living in the area in December 2020 (QM Beusselstraße, 2023).

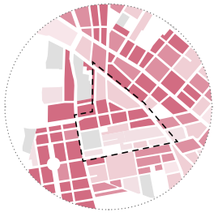
The area is in an insular position, as it is bordered to the south by the Spree River, to the west by the canal "Charlottenburger Verbindungskanal", to the north by railroad tracks, and to the east by the heavily trafficked Beusselstrasse with freeway access. The lack of connectivity also continues within Moabit West: the presence of industrial areas divides the residential areas into individual patches. Here, industry has a historical origin in Moabit. In the course of industrialisation in the 19th century, various companies settled in the district, which led to strong population growth and developed Moabit into a working-class district (QM Beusselstraße, 2023).
Today, the area is still characterised by a high population density (see Fig. 65) with a lack of public green spaces (see Fig. 66). Due to the heavily sealed industrial areas, the degree of sealing is very high, which leads to increased heat stress in summer (see Fig. 67). Nevertheless, the area is well accessible via the S-Bahn ring station "Beusselstraße" and the area offers a high mix of social institutions. In addition, existing green spaces hold potential for enhancing the quality of stay and surrounding parks, allotments and forests are easily accessible, so it is important to strengthen their connection to the area.



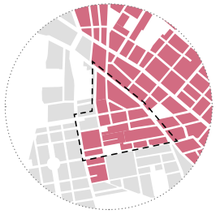

[Fig. 68] Distances to green infrastructure on city scale (by author, based on Google Maps, 2023)



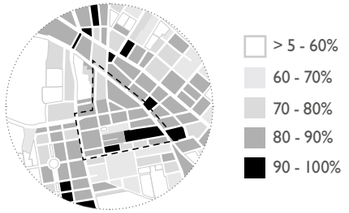
[Fig. 69] Satellite view




[Fig. 70] Population density




[Fig. 71] Provision of UGS m²/in

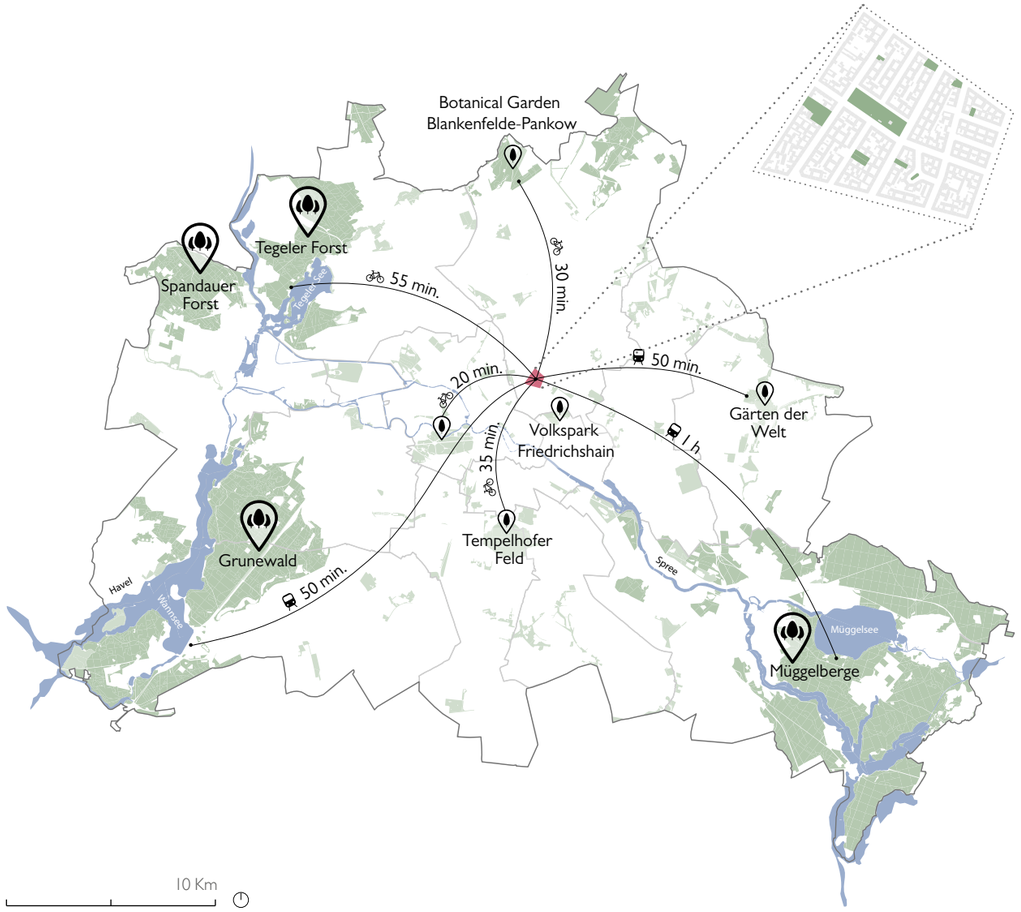



[Fig. 72] Amount of sealed surface

The second area, Flughafenkiez, lies in the northern part of the district "Neukölln" and is dominated by residential uses that are complemented by commercial functions along the surrounding high-traffic streets on the western and eastern side. A former brewery in the southern part forms now a mixed-used area with functions varying from a museum to an urban gardening project. Flughafenkiez covers a surface area of circa 52 ha.

The area is very well connected by public transport, as it is in the immediate proximity of U7 and U8 subway stations and a few minutes' walk from the S-Bahn ring. The lack of urban green spaces (see Fig. 71) and places for encounter in the neighbourhood has a particularly negative impact due to the high population density (see Fig. 70). On the other hand, the area is within walking distance of large green spaces. For example, Tempelhofer Feld, Hasenheide and numerous cemeteries are located in the vicinity.

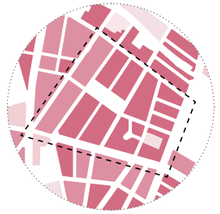
Due to the structure of the historic, closed block with small courtyards, the degree of sealed surfaces in the area is high and especially in the southern part on the "Rollberg-Areal" potential for unsealing can be found (see Fig. 72). Moreover, a particular challenge that emerged from conversations and observations at the field trip is the high level of vandalism and the consequences of drug use in public spaces.




[Fig. 73] Distances to green infrastructure on city scale (by author, based on Google Maps, 2023)



[Fig. 74] Satellite view




[Fig. 75] Population density


[Fig. 76] Provision of UGS m²/in


[Fig. 77] Amount of sealed surface

500 m

Lastly, Helmholtzkiez is part of Prenzlauer Berg and thus located in the district "Pankow". While the area is characterised by residential uses, several smaller businesses as well as gastronomy are established in the neighbourhood likewise.
The area comprises around 55 ha and is exceeding 550 inhabitants per hectare in many locations (see Fig. 75). Furthermore, the majority of the area is not sufficiently supplied with urban green spaces per inhabitant (see Fig. 76).

At the heart of the area lies the eponymous Helmholtzplatz, a popular meeting place due to its diverse amenities, including a playground, sports fields, rose garden, sunbathing lawn, and a neighbourhood house. However, the square alone cannot fully satisfy the population's need for green spaces. Additionally, smaller squares with a need for improvement in terms of quality of stay, playgrounds, and the Pappelallee cemetery park are located within the area. Nearby parks such as Mauerpark and Ernst-Thälmann-Park are also accessible, but often face overcrowding issues.

Similar to the second area, the historical closed block is the dominant buidling type here, leaving very limited space for unsealed green courtyards. However, attemps for green facades and planters in front of buildings can be seen at Helmholtzkiez.

## 4.3 FIELDWORK

Next to gathering qualitative data, conducting fieldwork allows for a qualitative insight into the conditions on site and the needs of the people. Since the project evolves around personal well-being, it was essential to get into direct contact with residents and professionals. Moreover, site visits enabled a better understanding of the current challenges, potentials, and ongoing projects at the locations, which gave input for the design objective. In addition, the fieldwork provided insights in terms of a "reality check".

In December 2022 and January 2023, the three locations were visited 1-2 times for several hours each. Next to observations and taking pictures and videos to capture the environment with different senses, info material from different institutions was collected. It is important to consider that the pictures were taken in winter, thus the impression of an area might be notable different in different seasons when trees are in leaf. While being on site, 14 pedestrians were interviewed using a set of questions for semi-open street conversations (see appendix 3). While talking to the people, the questions were slightly adapted, depending on the circumstances. Especially, the questions that required ranking on a scale from 1-10 were asked as open-ended questions instead. This approach made them more seamlessly integrated into the natural flow of conversation.

Nevertheless, the conversations are not representative due to their qualitative character and the small amount of interviewed persons, yet they give insights to draw an atmospheric image of the perception of the areas by the people. However, attention was paid to selecting a variety of people from different age and gender to create a balanced impression. Furthermore, the majority of interviewees was living in the chosen areas.

Additionally, the contact with professionals that work with residents in the areas offered new insights from a different point of view. Therefore, during an online meeting with an employee of the district management Beusselstraße, useful information about the area and ongoing projects were shared and I was able to ask questions. The district management is active since 1999 and is funded by the urban development program "social cohesion".

On the second visit of Moabit West on January 6th, 2023, an employee of the mobile district work showed me the area by foot with a focus on the existing green spaces, while we had a conversation about the challenges and opportunities in the neighbourhood. By walking together through the area, more insights could be gained and places were discovered that are only known to people with local knowledge. The mobile district work is directly present on site and at the neighbourhood center "Stadtschloss Moabit" where a frequent exchange with the residents is happening.

In area 2 (Neukölln Nord), a conversation at a neighbourhood centre at Schillerkiez with a social worker, a volunteer, and a resident was held to get an idea of the current situation in the neighbourhood regarding the provision of urban green spaces, awareness and personal well-being.

Overall, the fieldwork contributed to getting answers for the fifth research question:

*How do the residents in the chosen neighbourhoods experience the relationship between their personal well-being and urban nature?*

A recurring finding is that the majority of respondents consider nature to be very important in their lifes and highly value natural areas. Furthermore, it was frequently stated that nature is insufficient or missing in the surrounding areas. In the Helmholtzkiez neighbourhood, it was emphasised several times that people drive out to Brandenburg in the north to experience nature. It is also interesting to point out that especially respondents with children like to spend time in nature and therefore strive for green spaces, and among children the need for playgrounds was also made clear.

In the interviews with people with a migration background in Neukölln Nord and Moabit West, it was noticeable that the lack of nature was mentioned less frequently and satisfaction with the current state of the neighbourhood was expressed instead. Here it is unclear whether the questions should be phrased differently or whether cultural differences play an influence. It should be further mentioned that the number of respondents is not sufficient to get a generalised picture. Nevertheless, it is interesting to note cultural differences. For example, a study by Kabisch & Haase (2014) also highlighted the different usage preferences of parks by Turkish migrants.

Lastly, an impression video of the field trip is accessible via the link below. The video illustrates the contrast of urban stressors and diverse urban nature in Berlin.

Scan for an impression video

[Fig. 78] Impression after field trip



## IMPRESSIONS
## HUTTEN- & BEUSSELKIEZ - MOABIT WEST

*"There are nice places here but not a lot of people know them because they are kinda hidden. And there are mainly plagrounds but that's not the same as green spaces. I would not go to a playground if I want a quiet and peaceful place."*

*"At the canal side is always trash, people throw away their couches and so on. But I often watch the swans there too"*

*"I like to walk my dog at Castle Charlottenburg or on the other side of the canal."*

*"In the end we just started planting ourselves and stopped waiting for the permit. With the missing staff everywhere, things take ages."*

*"We always go to the playground with our kids."*

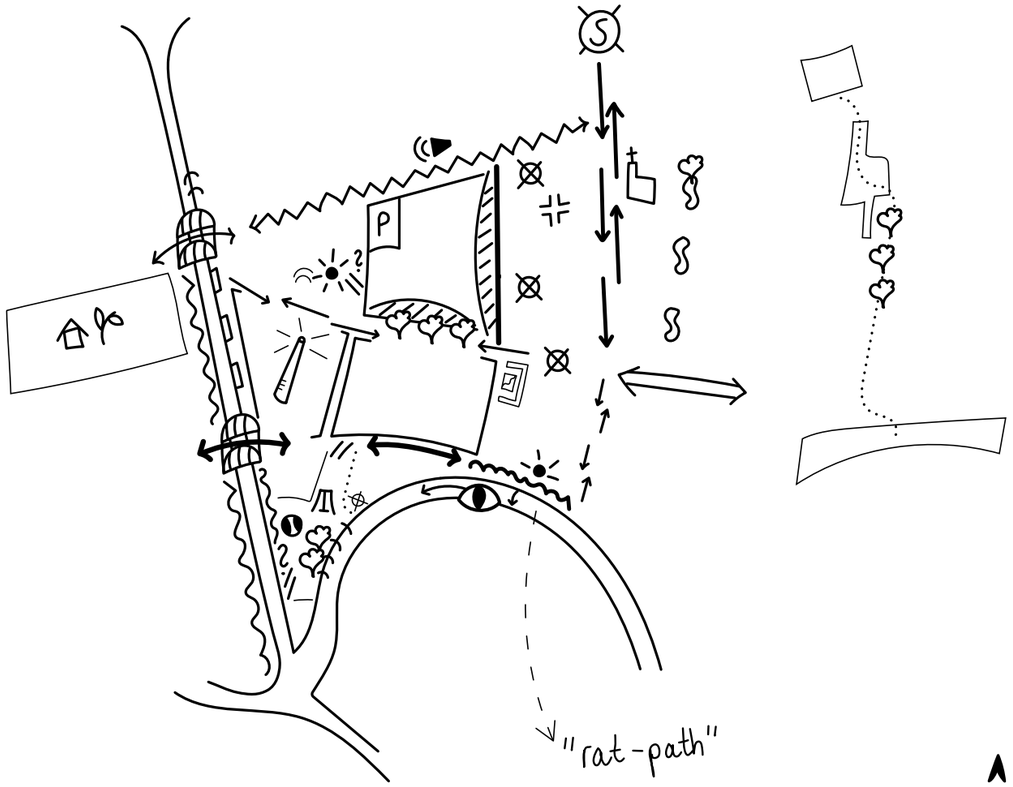
*"It is green enough here. I like to live here."*

*"Teenagers call it the ratpath because there are rats everywhere."*

*"Sometimes families or youngsters gather at the tables and eat dinner here. Many people cannot afford moving to a bigger flat - and there are no flats available too - so they live under extremely confined conditions and need the public space as escape."*

*"Just a couple of benches would help already. Nowhere are possibilities to sit."*

*"You are looking for green spaces here? Haha, good luck, let me know when you find any."*




[Fig. 79] Mind map Moabit West





[Fig. 80] Place of encounter at neighbourhood center

[Fig. 81] Sport park Neues Ufer - variation of activities

[Fig. 82] Potential of waterfront

[Fig. 83] Lacking visibility and knowledge of existing UGS

[Fig. 84] Division between industrial & residential areas

[Fig. 85] Abundance of traffic area

[Fig. 86] Impression after field trip





*"As I get older, I really value nature. I often go to the [Tempelhofer] Field or Hasenheide and wander around the cemeteries."*

*"It's frustrating. Everytime you make something look nice, it gets destroyed. I planted flowers and they got cut off. If we put a bench here, it's stolen in a second."*

*"A lot of children have lost the contact to nature. They even find it disgusting to see a worm or to touch soil."*

*"Who wants to have green doesn't move to Neukölln."*

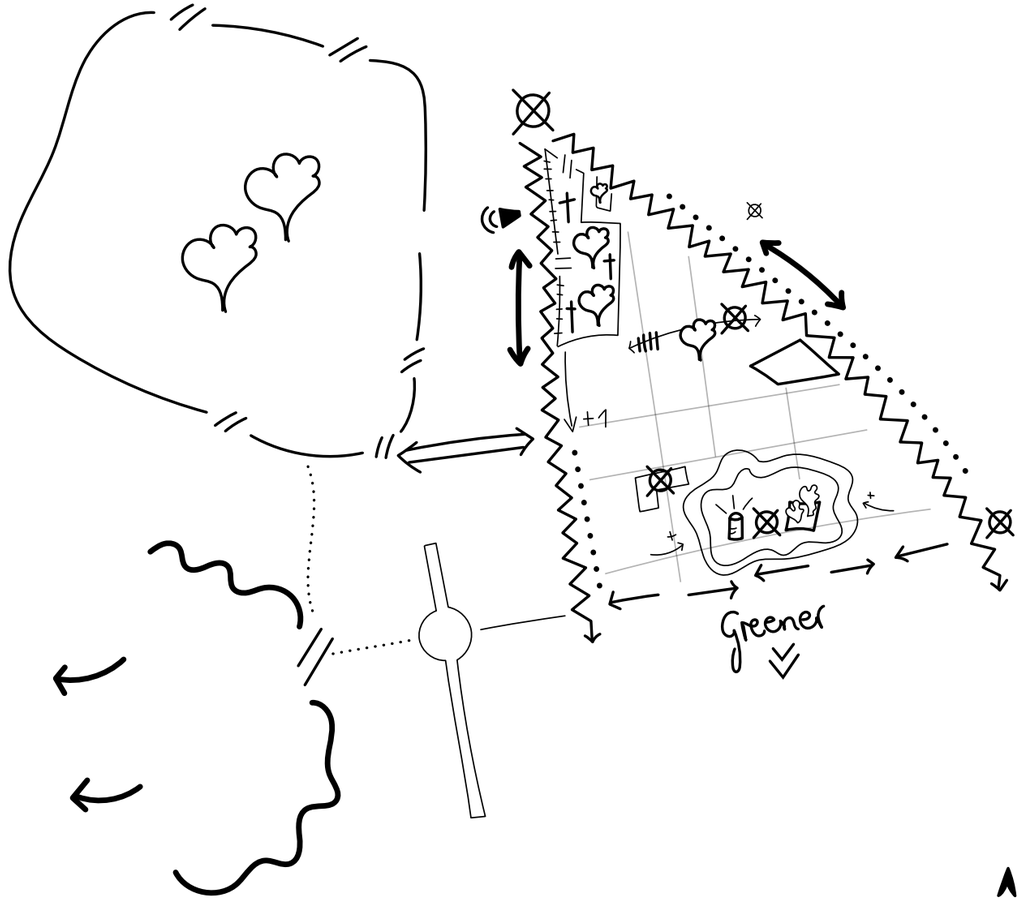
*"The biggest improvement would be if the trash was already gone."*

*"The area changed a lot in the last ten years. It's gentrified and becoming like Prenzlauer Berg. I have to move out because I can't afford it anymore as a freelancer."*

*"Traffic, trash, and people - these are the main issues. And too little green. I just want tranquility."*

*"The tree beds are used as drug couriers and dog toilets. And if you make the fencing too inviting to sit on, people will gather there to drink in the night and the noise is disturbing the neighbours."*

*"The existing squares and parks are good, they should just stay and not be built up with new houses."*




[Fig. 87] Mind map Neukölln North





[Fig. 88] St. Jacobi cemetery - in use

[Fig. 89] Rollberg - Urban Gardening project

[Fig. 90] Using the limited space of courtyards

[Fig. 91] Trash and lacking awareness

[Fig. 92] Boddinplatz - monotonous design

[Fig. 93] Traces of drug consumption in public spaces

IMPRESSIONS
HELMHOLTZKIEZ - PRENZLAUER BERG


[Fig. 94] Impression after field trip



*"We often go to the surrounding parks and playgrounds to do sports. In the weekends everyone goes to the outskirts and then the parks are nice and empty again."*

*"I feel more connected to the neighbourhood than in the small town where I am from."*

*"More green is needed but where? Everything is built up."*

*"The traffic is stressing me out the most."*

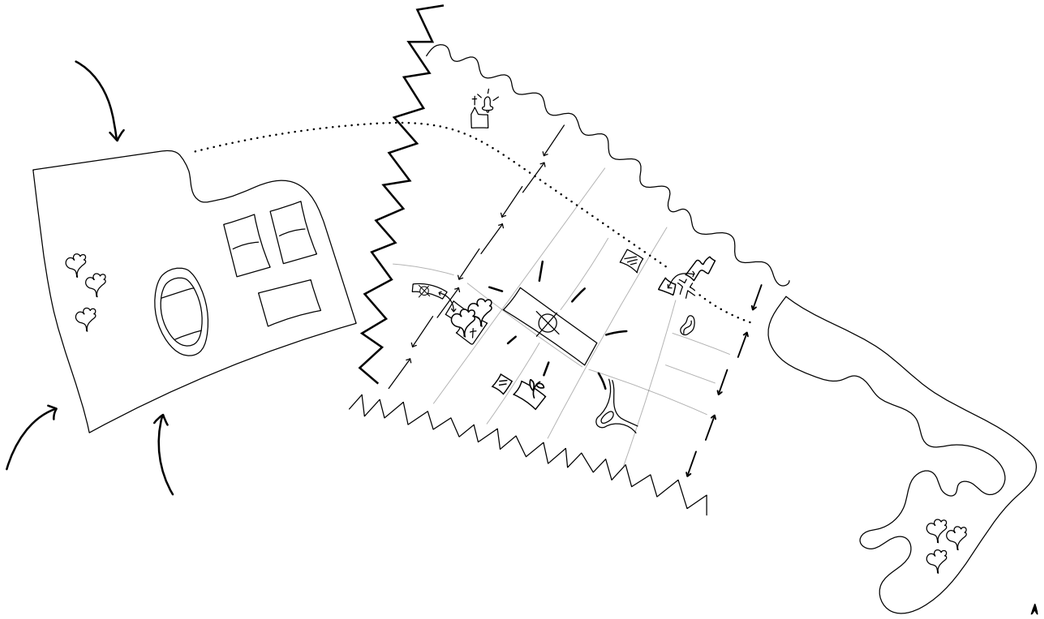
*"I am preferably on my balcony. Everywhere else are too many people. When I go for a run in the park, I am more stressed afterwards."*

*"I like the Helmholtzplatz because of the quiet streets surrounding it and my eyes can see the sky, I like the wideness."*

*"We like the playgrounds for our kids and it's very green here"*

*"Nature is very important for us and so we often drive north to the countryside."*

*"They are building up everything until the last green space is gone."*



[Fig. 95] Mind map Helmholtzkiez





[Fig. 96] Former cemetery park

[Fig. 97] Playground with natural elements

[Fig. 98] Helmholtzplatz - diverse areas for different uses

[Fig. 99] Public square - choice of materials and furniture

[Fig. 100] Bikes parking on trees - missing bike racks

[Fig. 101] Starplatz - sealed surfaces & lacking quality of stay

## 4.4 CONCLUSION - ANALYSING BERLIN

This chapter was dedicated to the analysis of the case study location of Berlin. It examined the spatial characteristics with a focus on the green-blue structures and versatile types of urban nature within the city. Moreover, existing instruments in form of development plans, strategies and concrete measures that are relevant for the implementation of restorative environments were displayed. It appears that the current plans of Berlin's authorities acknowledge the importance and qualities of the existing urban green spaces in theory, yet there is a lack in implementing the ideas in practice.

Furthermore, an important method for understanding the conditions at the three focus areas was the fieldwork, consisting of observations and conversations with residents and professionals. Therefore, the visits helped in setting the design objective. While all three areas are characterised by high population densities, a lack of urban green spaces, and a large amount of sealed surfaces, the areas show differences in their spatial characteristics and population composition.
Consequently, the following design strategies in the next chapter include mutual ideas for all three areas as well as specific interventions depending on the differing challenges.

# CHAPTER 5

## RESTORATIVE DESIGN STRATGIES

The fifth chapter is dedicated to the application of the findings into visions, guidelines, and concrete design strategies, based on the Pattern Language “Restoration with Urban Nature”.
The results of the participatory workshop are incorporated into the design and a strategy for the implementation of design ideas is presented. Lastly, the design strategy is evaluated based on its contribution to ecosystem services and restoration.

Public space with potential for qualification
Boddinplatz, Neukölln, Berlin

"But in cities there is so much more to walking than walking! There is direct contact between people and the surrounding community, fresh air, time outdoors, the free pleasures of life, experiences and information. And at its core walking is a special form of communion between people who share public spaces as a platform and framework." (Gehl, 2010, p.19)

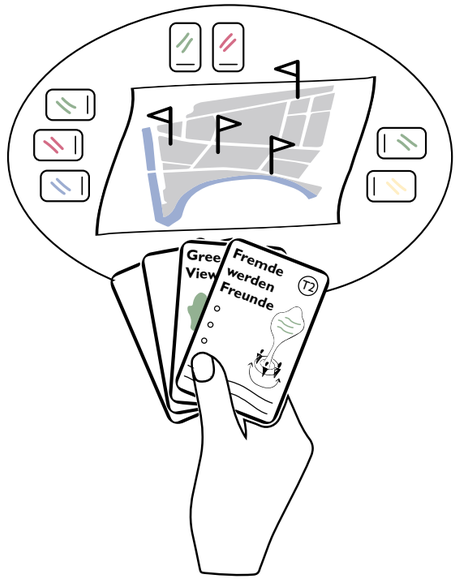
# 5.1 CO-CREATION WORKSHOP

An essential element of inclusive urbanism is participation. When conducted early in the design and planning process, it offers possibilities for co-creation and thus improves the outcome of the project. Moreover, giving a voice to the people affected enhances the feeling of responsibility and identification.

A pattern language offers a suitable tool for co-creation. Therefore, conducting a participative workshop with different stakeholders is a good way to gather insights about an area and first design ideas while also offering valuable feedback for the pattern language development.

Since the design and planning focus lies on Moabit West, the workshop was organised for the area in cooperation with the neighbourhood center "Stadtschloss Moabit" with the support of the mobile district work as part of the organisation "Moabiter Ratschlag".

The goal of the workshop with the title "Stadtnatur im Alltag für Erholung im Kiez" (translation: Daily Urban Nature for Restoration in the Neighbourhood) was to test the pattern language "Restoration with Urban Nature" by applying it to the area in a playful setting, collecting feedback on the patterns, and identifying the strengths and weaknesses of the area to consequently develop a vision for a futureproof Moabit West. Also, room was given for feedback on first design ideas to qualify the area in terms of the availability of restorative environments that foster encounter and climate adaptation at the same time.




[Fig. 102] Playful workshop with patterns

*Setup of the workshop*
The workshop was held on 19th of April, 2023 at the neighbourhood center Stadtschloss Moabit in Berlin and was intended to host a maximum of 15 participants that would work in 3 groups. Eventually, only three people attended which led to some small adjustments in the program. The three participants would discuss their ideas between each other and the smaller group allowed for a more intense exchange of thoughts and ideas.
In total, the workshop lasted 2,5 hours and the schedule could be maintained. For more information about the announcement and detailed assignments see appendix 1 and 2. Moreover, the workshop consisted of four different parts:

*1. Introduction and ice-breaker (30 min.)*
- Everyone introduced themselves, shortly explained their connection to the area and named a one-word association with urban nature
- Short presentation about the theoretical background of urban stressors, restoration with urban nature, and the current state of Moabit West

*2. Brainstorming with Patterns (30 min.)*
- Individual and collective evaluation of the patterns, including the collection of own ideas and discussion of the choices

*3. Analysis and ideas for the area (45 min.)*
- Identification of potentials and deficits in the area by locating green (potential) and red (deficits) flags and adding suitable patterns in form of coins to the specific places on the map
- Formulation of wishes and visions for the area in 50 years

*4. Final discussion and conclusion (45 min.)*
- Presentation and discussion of first design options, summary and feedback

The intended 15 minutes break was not necessary, therefore more time was available for discussing the third part.

*Materials:*
- 3 x set of pattern cards
- Red, green and yellow dots for evaluation of patterns
- 3 x map of the area
  - Flags
  - Coins with pattern numbers
- 3 x systemic section of the area
- Additional writing material
- 2 x collages of potential future state of the area with different focuses
- 4 x before and after impressions of design interventions
- Vision maps on different scales

*Outcome*
The workshop provided insights on two levels: methodologically and content-wise. Methodologically, it was possible to adapt the setup to a smaller group of participants. Consequently, the results are not representative, yet they offer impressions and ideas that are reflected in the design. Also, the pattern language was tested successfully and the idea of a playful co-creation setup worked out. Improvements are possible in the collection of feedback on the design ideas. For further elaboration see chapter 6.4 (reflection).

On the other hand, valuable insights regarding the functionality and comprehensibility of the pattern language "Restoration with Urban Nature" were collected. According to the feedback of the participants (see also appendix 1 and 2), the patterns were very understandable and provided a useful tool for discussing different needs and interests. Interest in using

the pattern language in the future within participative settings was formulated.

Also content-wise offered the workshop new findings, that enrich the understanding of the area with its specific needs and qualities. The participants highlighted the need for public places of encounter. Thus, the pattern G3 “From strangers to friends” got chosen from all the participants. Related to that, the importance and potential of community gardens was emphasised. Also, the need of benches everywhere in the area became clear. Another potential of Moabit West is the location within two waterfronts, that is currently insufficiently used and known.


[Fig. 103] Results of pattern evaluation and formulated wishes

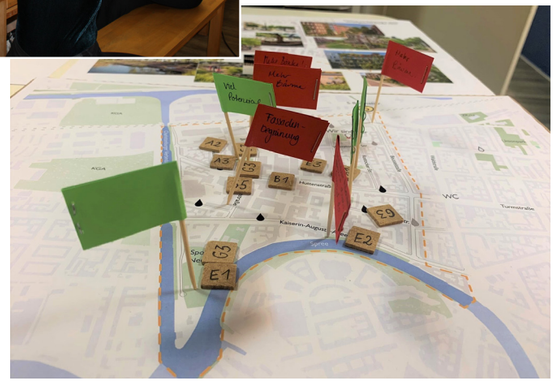
Furthermore, two main topics arose from the discussion about the wishes for the future of the area. Firstly, the creation of qualitative and inclusive places of encounter in various forms, reaching from accessible community gardens for everyone to public (green) roof tops was stressed.
Secondly, the participants formulated the desire for a simplification of participation opportunities in form of an online-tool or less complicated bureaucratic processes to invite more residents to engage themselves in the neighbourhood.

*Problems:*
Due to the small and quite heterogeneous group of participants (female, n=3) the results are not representative for the whole community living at Moabit West. Thus, the pattern language could be perceived differently by a more diverse audience and the participants do not represent everyone’s needs. Also, in a different group setting there might be more opposing opinions than it was the case now. However, the participants brought different expertise into the discussion since they were either working or living (or both) in the area.

Unfortunately, some other invited professionals were unable to participate and less residents appeared than signed up. To conclude, at future workshops attention can be paid to advertising even more to engage more people to participate. Moreover, the results deliver new insights and confirm previous ideas, yet a generalisation has to be avoided. It is the urbanist’s role now to emphasise with the needs of other societal groups to represent their needs as well.



IMPRESSIONS
19.04.2023


All other images are by the author.

# 5.2 DESIGN INTERVENTIONS WITH PATTERNS

The following section is dedicated to the design interventions at the focus area Moabit West.

The basis for the design interventions is formed by guidelines for restorative urban nature. These guidelines are based on a literature review of restorative environments and restorative urbanism. The guidelines serve as a reference for all developments in the field of restorative urban nature and are thus transferable.
Furthermore, the pattern language "Restoration with Urban Nature" forms the foundation for the design and strategy and provides ideas for the transformation of the area.



## GUIDELINES FOR RESTORATIVE URBAN NATURE

Multidimensional:
- Designed in a way that it contributes to restoration of humans and environment

→ Every intervention is related to ecosystem services
- Connected through different scales

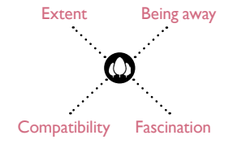
Inclusive:
- Takes into account the needs of *all* living organisms
- Developed in a participatory process
- Ensures environmental justice

Sensory:
- Activates several senses
- Fosters involuntary attention

(Inter-) Active:
- Enables physical and mental activity
- Invites for encounter and exchange with others (human-human relationship
- Facilitates interaction with the natural environment (human-nature relationship)

Regular:
- Is part of the daily experience

Informative:
- Raises awareness for the importance of nature contact for improved well-being, urban climate, provision of ecosystem services
- Holds incentives for the investment in UGS


[Fig. 104] Frameworks (by author, based on Roe & McCay, 2021 and Kaplan & Kaplan, 1989)

## SWOT ANALYSIS

As basis for the design interventions, a SWOT analysis for the area Moabit West was done in addition to the previous analysis. SWOT stands for “strengths”, “weaknesses”, “opportunities” and “threats”. Several challenges and potentials were identified.

### STRENGTHS

Highly mixed-use
Sport park Neues Ufer
Canal and river side
Social institutions
Engaged, active inhabitants

### WEAKNESSES

High population density
Undersupply of UGS
Noise- and air pollution
Sealed up surfaces, especially in industrial sites
Lacking core/ places for encounter or identification

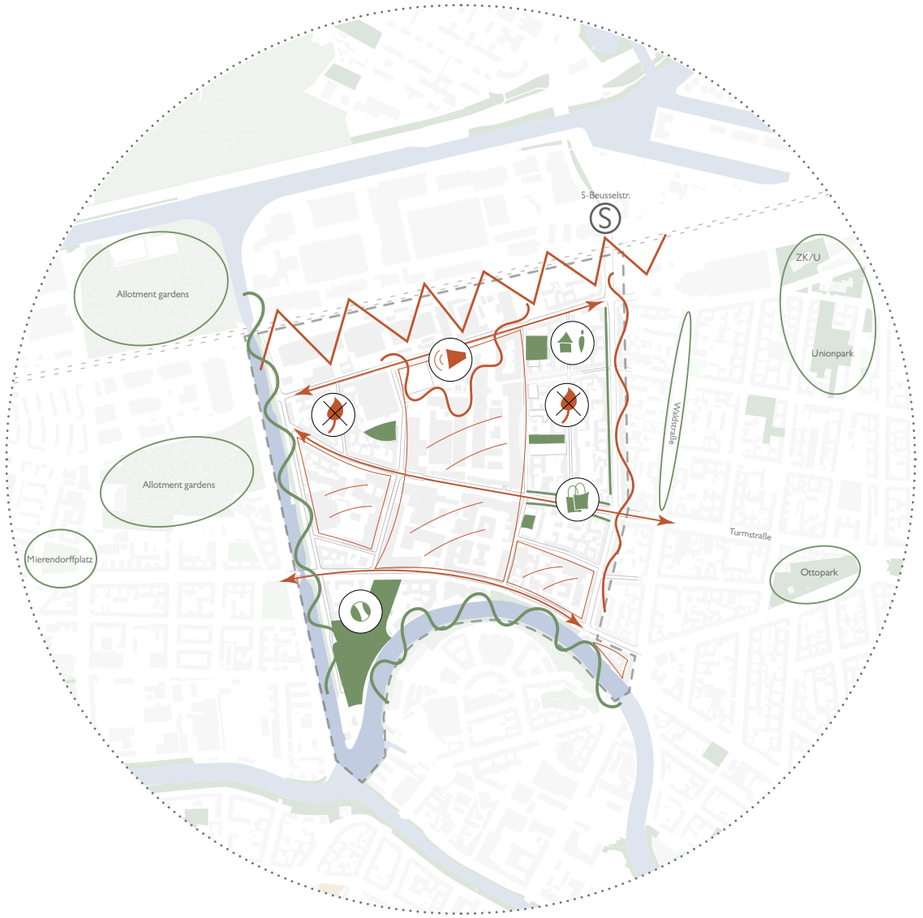
### OPPORTUNITIES

Existing green spaces (for now focus on playground function) and green spaces in surroundings
Industrial sites: futureproof transformation
Transformation of parking houses/ car sales (potential mixed-use with housing)
Restructuring of wide street profiles

### THREATS

Housing market: rising needs, rising rents
Land use conflicts
Climate change: heat stress, drought, flooding after heavy rainfalls






[Fig. 105] Strenghts and weaknesses

## DEVELOPING GOALS FOR THE DESIGN AND STRATEGY

Based on the SWOT analysis, goals for the development of the area were developed. The goals are directly linked to the existing potentials and challenges and guide the design decisions. The following section introduces the development goals before presenting the design and implementation strategy for Moabit West.

CREATE places of encounter within the area

→ strengthened social cohesion and identification

STRENGTHEN AND QUALIFY existing urban green spaces in connection to adjacent social institutions, including the sport park Neues Ufer

→ improved visibility and connections
→ restorative and ecological qualification

DEVELOP the waterfronts

→ improved accessibility and quality of stay
→ enhanced ecological quality

TRANSFORM the streets and reduce traffic

→ restructuring of existing space
→ reduced noise and air pollution

ENSURE the supply of UGS and daily nature contacts

→ new development of UGS
→ green facades and rooftops

FOSTER a better exchange between the areas

→ using the potential of a mixed-use area with various functions

INVITE for participation and interdisciplinary collaboration

→ developing all interventions in a participatory way
→ including several stakeholders

ADAPT the industrial sites in the long term

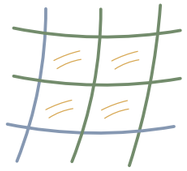
→ unsealing and greening
→ futureproof functions

FACILITATE a climate adaptive development

→ applying measures to reduce heat stress
→ rainwater infiltration and retention

## DESIGN CONCEPT - A GREEN-BLUE NET FOR RESTORATION AND ENCOUNTER

The overarching concept for a restorative Moabit West consists of a green-blue net for restoration and encounter. Since there is a lack of qualitative green spaces and meeting places in the public space in the neighbourhood, the development of these spaces is very important.



[Fig. 106] Logo green-blue net

The green-blue network is based on the existing street and green space structure, as well as the two waterways. By transforming the street space into traffic-calmed areas with green encounter zones, the public space is qualified and the various sub-areas as well as the surrounding green spaces are connected.

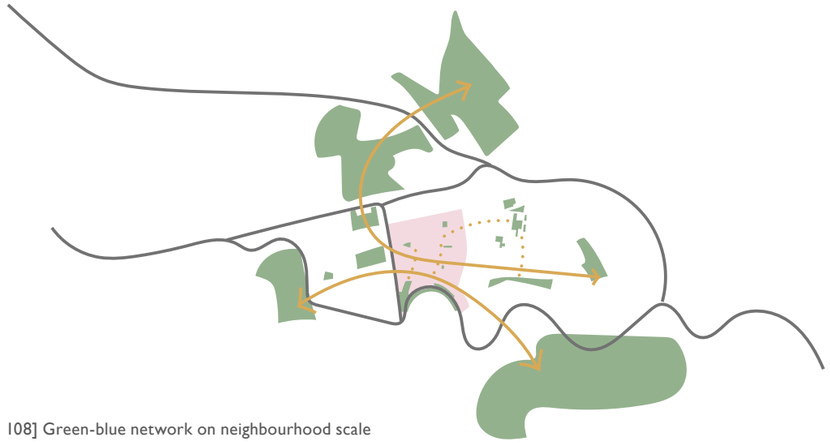
Here, a distinction is made between main and residential streets, while the residential areas are completely traffic-calmed with bike streets. Furthermore, the transformation of the characteristic street corners, in addition to the meeting zones, offers potential for further exchange within the neighbourhood. The qualification and redevelopment of green spaces according to restorative urban nature guidelines adds to the green space available in the area for daily nature experiences. Likewise, waterfronts are qualified and better accessibility is ensured.

As every centimetre counts in the area, all suitable roofs and facades are greened, which provides cooling effects, additional habitats for living beings, as well as aesthetic benefits. The heavily sealed industrial areas are gradually unsealed where possible, and less sustainable companies are converted in the long term into mixed-use areas with residential uses and green recreation possibilities.

Eventually, the goal is to develop Moabit West as an attractive place to live and work, where daily encounters with nature and neighbours are possible. In addition, the neighbourhood becomes a habitat for diverse species, can store rainwater, heats up less in hot periods, and is connected to the larger green network (see Fig. 108).
Also, better connectivity to the surrounding neighbourhoods and their existing green spaces is promoted through the expansion of bicycle connections and a pedestrian and bicycle bridge over the Spree River.



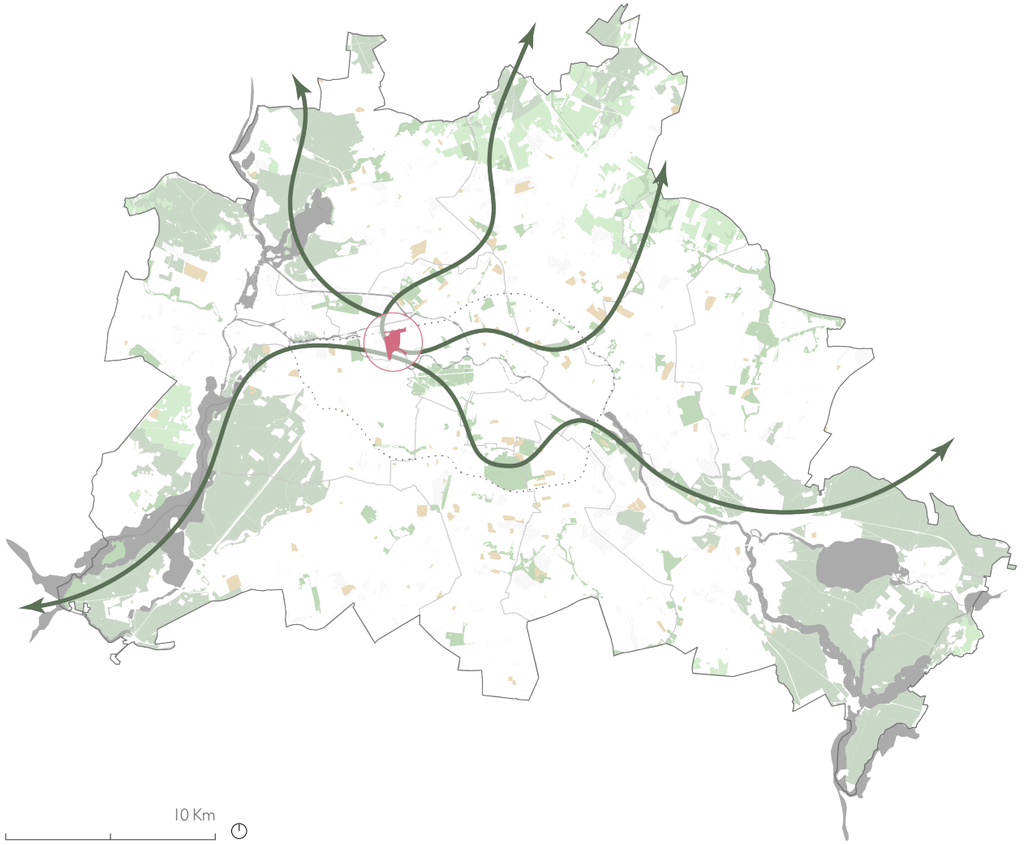

[Fig. 107] Design for a restorative Moabit West - local scale



[Fig. 108] Green-blue network on neighbourhood scale



The development of the green-blue net starts on the local scale within the design area of Moabit West. However, to form a wider network that is connected with the green-blue infrastructure of the city and metropolitan region of Berlin, the vision does not stop at the borders of the design area. Instead, connections to the existing urban green spaces and water structures are formed, allowing for wildlife corridors and continuous routes for recreation.
Lastly, the goal is to create an integrated network that offers possibilities for restoration on various scales. This can be achieved by developing different areas of Berlin following the guidelines for restorative urban nature and eventually forming a coherent green-blue network spanning the whole city (see Fig. 152).




[Fig. 109] Green-blue network on city scale

## APPLICATION OF PATTERNS AT LOCATION: MOABIT WEST

- G1 Nature around the corner
- G3 From strangers to friends
- A1 Fit with nature
- A2 Plant with me
- A3 Sit with me
- A4 A tree friend
- E1 Cool down
- E2 Water inside/out
- E3 Open up!
- E4 Leftovers
- E6 Less cars, less stress
- B1 Free pee
- B2 Free drink
- S1 Green view
- I1 What do you think?
- I2 Alliances

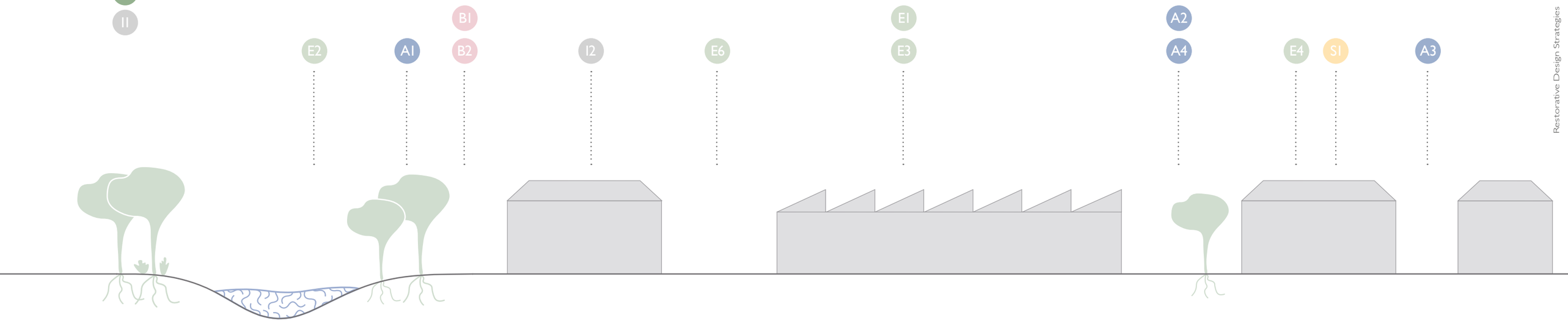
The systemic section highlights the primary features of the neighbourhood and presents the transition towards a restorative Moabit West by applying the most relevant patterns for the area. Given the overall lack of urban green spaces and opportunities for social encounters, patterns G1 and G3 are applied to the entire area. Furthermore, special emphasis is placed on the water edge, street scapes, and adapting residential and industrial areas. The subsequent chapter examines specific actions in more detail, revealing further pattern applications.

- G1
- G3 For the whole area
- I1










[Fig. 110] Systemic section current state with applied patterns

# 5.3 IMPLEMENTATION STRATEGY

Phase 1:
0-2 years
Preparation & Formation of the frame

1.1 Qualification of playground Wiebestraße

1.2 Transformation of street profiles with green encounter zones, corners, (1.3) and residential streets to bike streets (1.4)

1.5 Start of unsealing, greening and creation of green façades in suitable areas

1.6 Planting of missing street trees

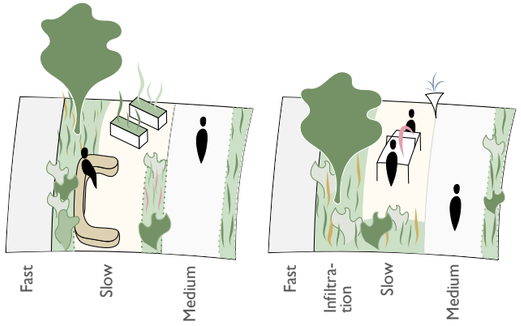
[Fig. 111] Phase 1

Existing
New development/ qualification
Street transformation/ connections
Unsealing/ transformation
New trees
Railways
Water
Design area

(1.1)

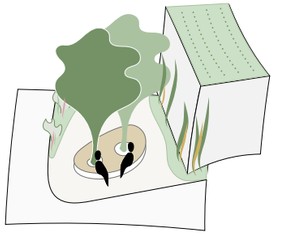

**Actions:** Planting of shady trees, temporarily installation of sun awnings, urban gardening area in cooperation with Kindergarten, removal of parking, exchange of gate for better visibility and accessibility, installation of drinking fountain & public toilet, barefoot path
**Actors:** District office Mitte, parks and roads department, kindergarten, residents, Berliner Wasserbetriebe (Berlin Water Services)

(1.2)



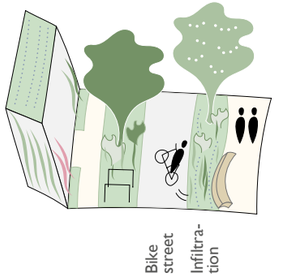

**Actions:** Partly substitution of parking by green zones with varying functions, species & furniture, moving of cycling lane, additional green beds between parking
**Actors:** Senate of Berlin, district office Mitte, parks and roads department, residents, adjacent commerce
**Policies:** Street trees campaign

(1.3)




**Actions:** Communicative seating furniture around existing trees & planting of new shady trees where needed, extension & addition of (tree) beds
**Actors:** District office Mitte, parks and roads department, residents, adjacent commerce

(1.4)




**Actions:** Implementation of bike streets (cars passing as exception with low speed), partly substitution of parking by green encounter zones as seen at (1.1) with infiltration areas and eadible plants, additional bike racks
**Actors:** District office Mitte, parks and roads department, residents
**Policies:** Street trees campaign, urban development vision: city of short distances

Phase 2:
2-5 years
Elaboration of the net

2.1 Development of the western waterfront

2.2 Further transformation of streets with additional parking space reduction

2.3 Extension of sport fields to park

2.4 Public rooftop garden

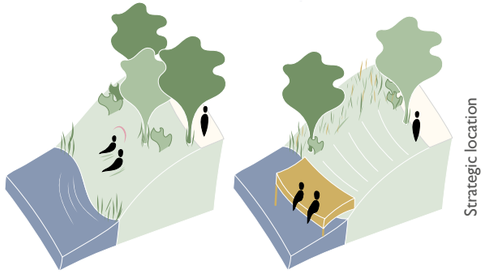
2.5 Green roofs at suitable locations

2.6 Adaptation of southern industrial areas

[Fig. 112] Phase 2

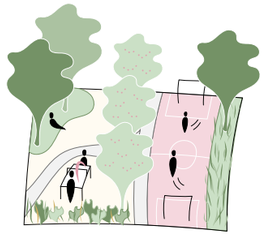
Existing
New development/ qualification
Street transformation/ connections
Unsealing/ transformation
Green roofs (residential/ industrial)
Public rooftop garden
Waterfront development
Railways
Water
Design area

(2.1)
Representative detail
Strategic location



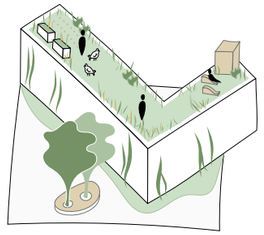
**Actions:** Natural waterfront instead of stone fastening, creation of accessible parts with wooden platform and seating steps and inaccessible nature reserve areas, widening of sidewalk, removal of fence at accessible locations
**Actors:** WSV (federal waterways administration), district office Mitte, parks and roads department, residents

(2.3)
Strategic location



**Actions:** Transformation of parking space to extension of sport fields as a neighbourhood park
**Actors:** Parks and roads department, residents, sports associations, youth club B8

(2.4)
Exception



**Actions:** Transformation of parking garage roof to public accessible rooftop garden
**Actors:** Land owner, residents, community garden association, gastronomy

(2.5)
Representative detail

**Actions:** Application of suitable green roof type depending on building structure, varying from extensive green roofs like brownfields or herbaceous to an intensive rooftop garden (see de Roode, 2022)
**Actors:** Housing associations, investors, residents, district office Mitte,
**Policies:** Funding via GrünDach Plus

Phase 3:
5-10 years
Expansion from net to network

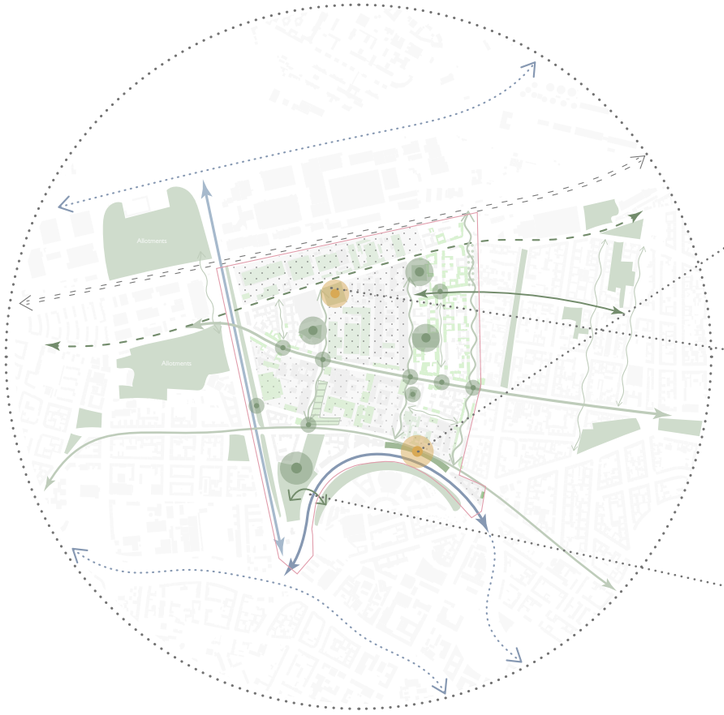
3.1 Development of the southern waterfront

3.2 Development of park instead of parking space

3.3 Pedestrian and bike bridge connecting the waterfronts

3.4 Connections to adjacent UGS

3.5 Adaptation of northern industrial areas



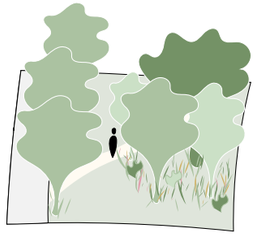
[Fig. 113] Phase 3

Existing
New development/ qualification
Street transformation/ connections
Unsealing/ transformation
Railways
Water
Design area
Waterfront development

(3.1) Representative detail

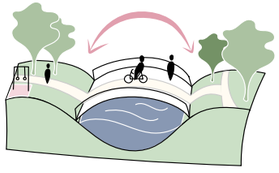
**Actions:** Widening of waterfront to promenade and transformation of adjacent street Kaserin-Augusta Allee with expanded cycling lanes and reduced parking
**Actors:** Parks and roads department, WSV (federal waterways administration), landscape architects, residents

(3.2) Strategic location



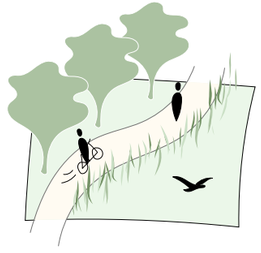
**Actions:** Transformation of Siemens' parking space to urban wilderness park with tiny forest
**Actors:** Parks and roads department, Siemens Energy AG, landscape architects, residents
**Policies:** Mixed forest program

(3.3) Edge



**Actions:** Construction of pedestrian and bicycle bridge connecting the river edges of the Spree between Mitte and Charlottenburg
**Actors:** District office Mitte, district office Charlottenburg, Parks and roads department, WSV (federal waterways administration)

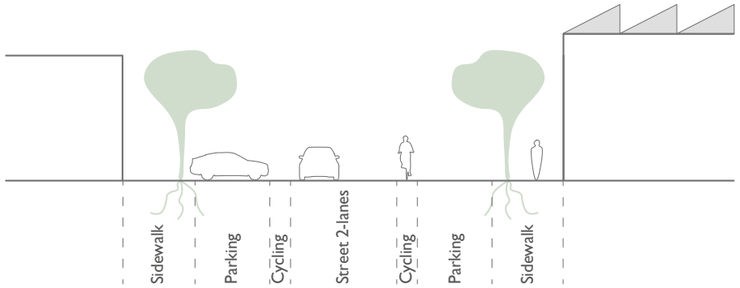
(3.4) Edges



**Actions:** Connections via cycling routes, creation of wildlife corridors via continuous street trees, open soil, green facades and green encounter zones
**Actors:** Parks and roads department, landscape architects, residents, environmental organisations, allotment garden association

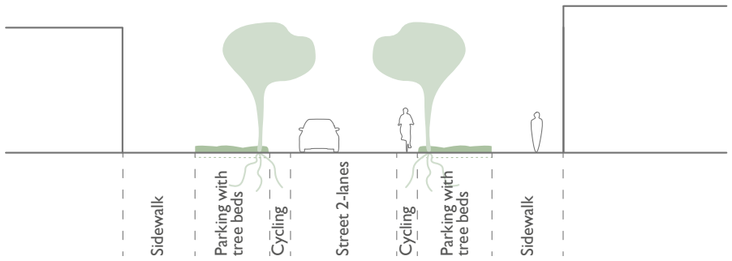
## STATUS QUO

### A) Huttenstraße




[Fig. 114] Section Huttenstraße A

### B) Huttenstraße variation with tree beds




[Fig. 115] Section Huttenstraße B

[Fig. 116] Tree beds between parking

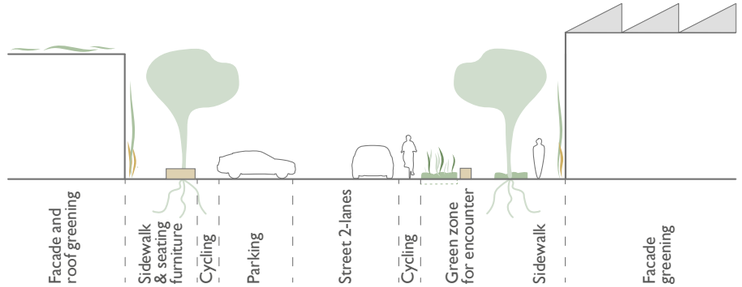
The densely built up areas leave only little room for the development of extensive restorative environments. However, the streets as predominant public spaces hold high potential for redesigning and can be transformed into valuable environments for encounter and ecosystems.

Green encounter zones host different functions to invite for resting, sports or gardening. By choosing pollinator friendly species and trees that offer food for birds and other animals, the quality of the zones is enhanced. A similar project can be found in vicinity at Waldstraße.



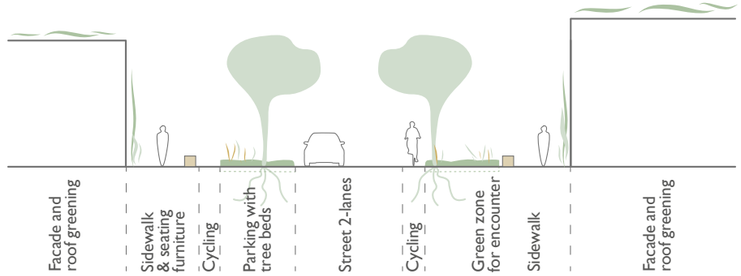


### A) Huttenstraße

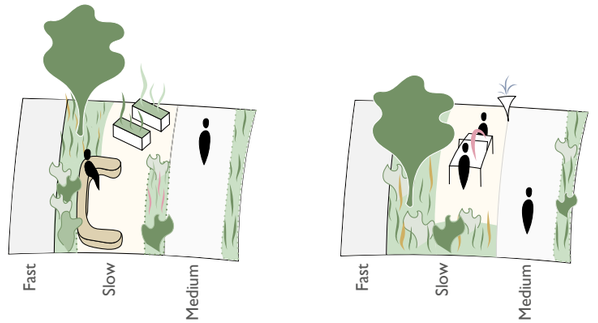



[Fig. 117] Section Huttenstraße A

### B) Huttenstraße variation with tree beds




[Fig. 118] Section Huttenstraße B

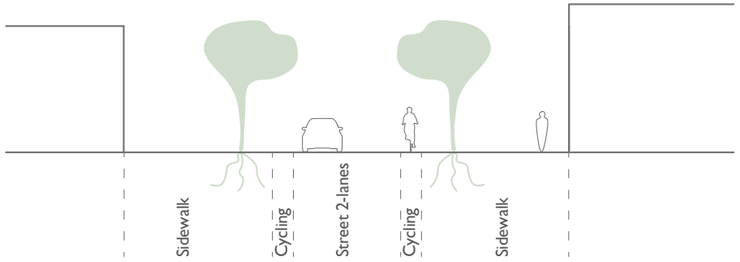



[Fig. 119] Green encounter zones

[Fig. 120] Green encounter zones for restoration

## STATUS QUO

### C) Crossings at Huttenstraße



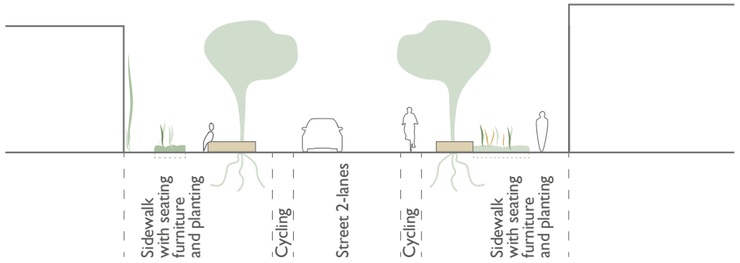

[Fig. 121] Section before - crossing Huttenstraße

[Fig. 122] Huttenstr./ Berlichingenstr.

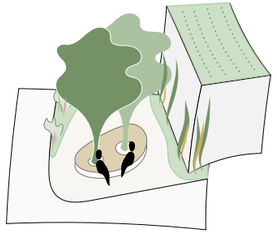
[Fig. 123] Huttenstr./ Berlichingenstr.

## REDESIGN

### C) Crossings at Huttenstraße - corners for encounter




[Fig. 124] Section after - crossing Huttenstraße



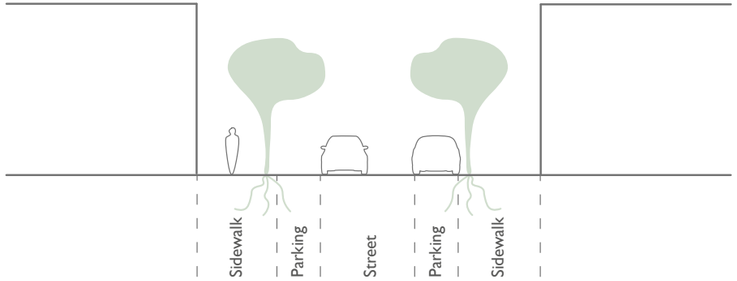
[Fig. 125] Crossings





## STATUS QUO

### D) Residential streets (generalised)



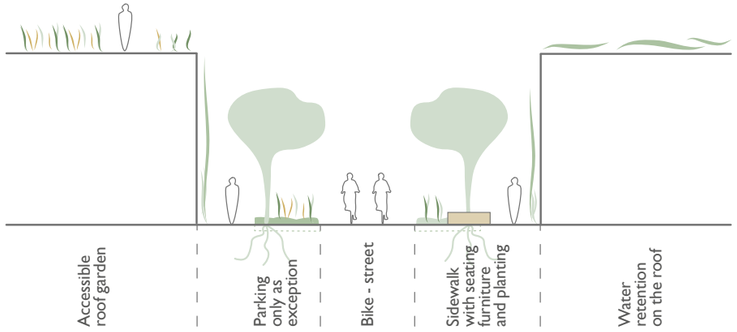

[Fig. 126] Section before - residential street

[Fig. 127] Green parking beds Rostocker Str.

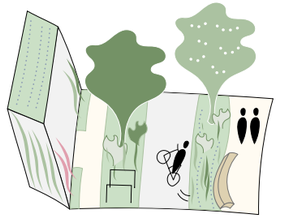
[Fig. 128] Moabiter Kissen

## REDESIGN

### C) Residential streets almost car free



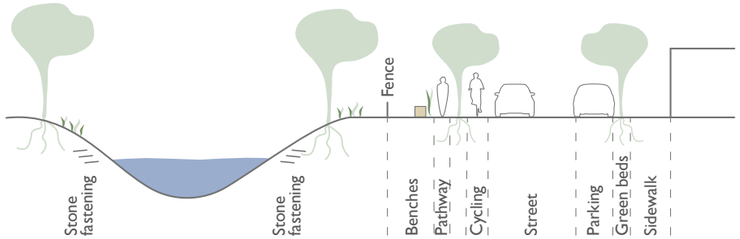

[Fig. 129] Section after - residential street



[Fig. 130] Residential bike streets

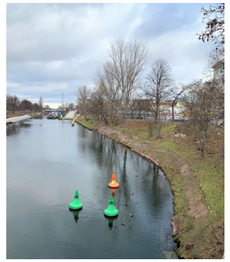
## STATUS QUO

### Canal edge “Neues Ufer”




[Fig. 131] Section before - canal edge

All pictures show the current state:

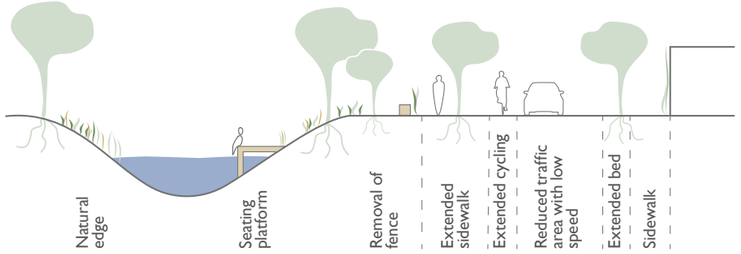


[Fig. 132] Canal edge “Charlottenburger Verbindungskanal

[Fig. 133] Pathway and benches along waterfront

## REDESIGN

### Natural canal edge with water access



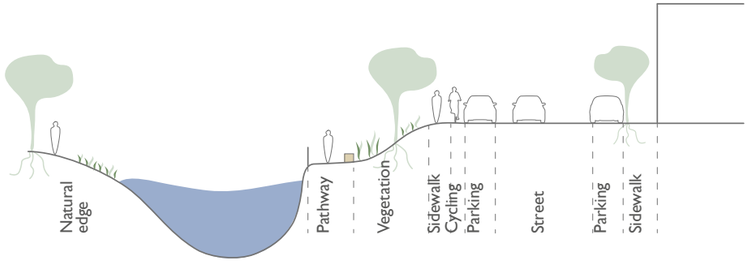

[Fig. 135] Section after - canal edge

[Fig. 134] Neues Ufer south side



## STATUS QUO

### River edge “Kaiserin-Augusta-Allee”




[Fig. 136] Section before - Spree river edge

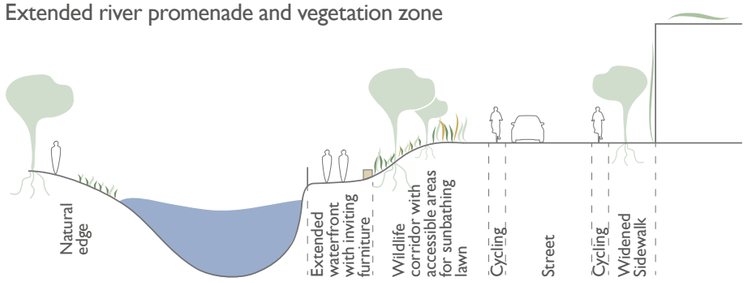
All pictures show the current state:

[Fig. 137] Kaiserin-Augusta-Allee

[Fig. 138] Waterfront of Spree river

## REDESIGN

### Extended river promenade and vegetation zone




[Fig. 140] Section after - Spree river edge

[Fig. 139] Benches and pathway

[Fig. 141] Natural river edge with water access

## BEFORE AND AFTER: IMPRESSIONS

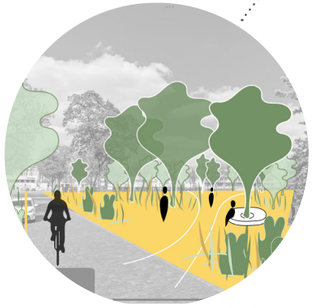
Before

After


[Fig. 142] Neues Ufer along the canal

Before

After



[Fig. 143] Urban wilderness park instead of parking area

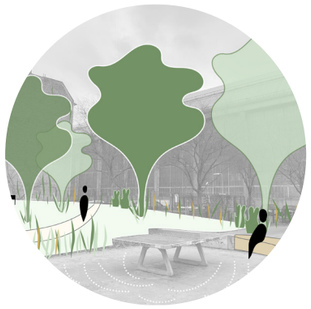
Before

After

[Fig. 144] Huttenstraße - facades and supermarket

Before

After



[Fig. 145] Extension of sport fields to park instead of parking

Before

After

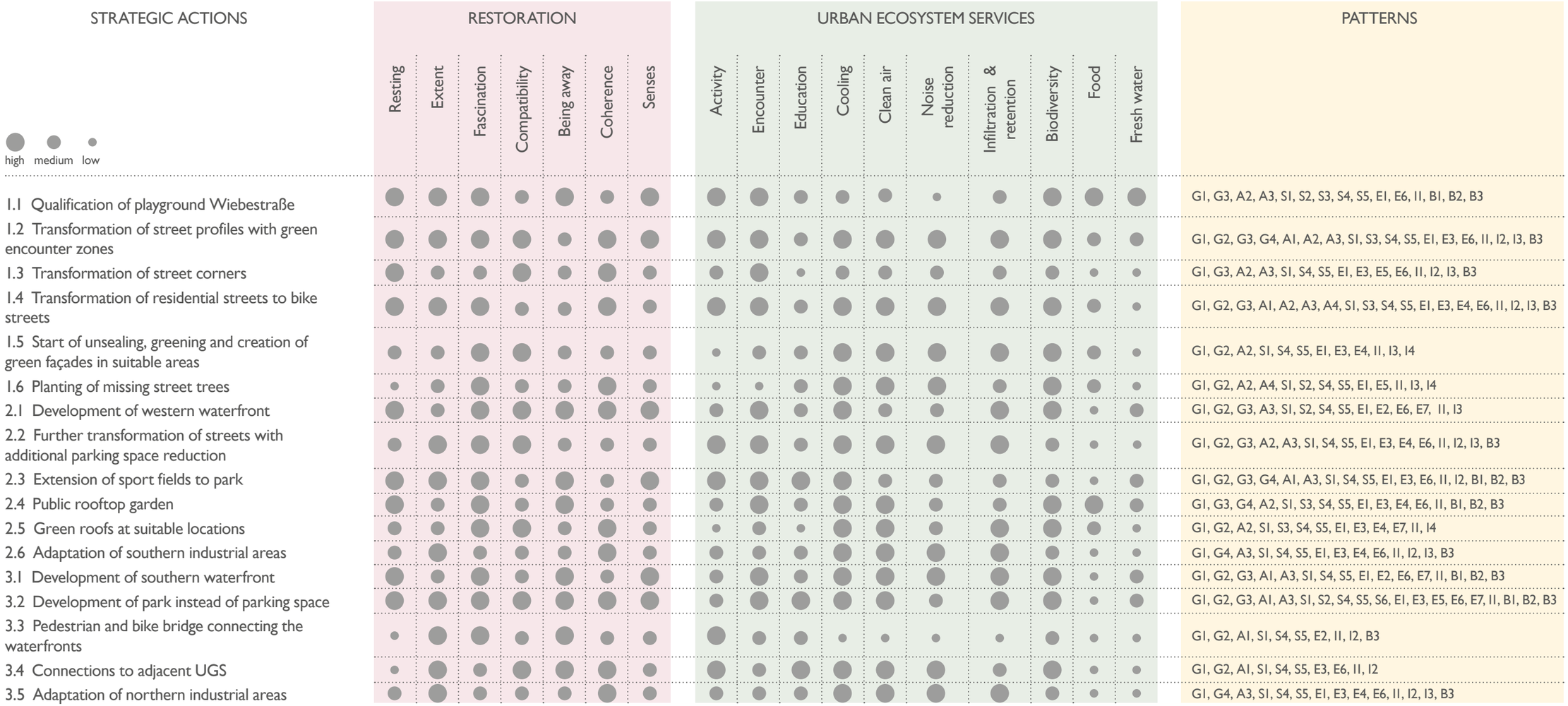
[Fig. 146] Transformation street profile Wiebestraße

Before

After


[Fig. 147] Street corner and parking on roof top - rooftop garden

# 5.4 ASSESSMENT AND EVALUATION



*Description of the method*
The assessment scheme was developed to gain an understanding of the impact of the different strategic actions regarding their contribution to restoration and urban ecosystem services. Additionally, the related patterns are listed for each intervention. In that way, the application of patterns becomes transparent and replicable for other projects.
The contribution to different criteria of restoration and urban ecosystem services is distinguished between low, medium and high impact. Moreover, the selected assessment criteria were derived from literature on the respective theories that were presented in chapter 2 - Understanding human-nature relationships. Based on educated guesses, the contribution of the strategic actions to the different criteria was determined.

*Evaluation of the assessment*
Evaluating the assessment can be done in different ways. Starting with focussing on the criteria with the highest occurrence of a high impact, it becomes apparent that within the category of restoration, the aspect of fascination is predominant. This can be explained by the fact that fascination is provided by natural environments. Since all the actions intend the creation or improvement of urban green spaces, enhanced fascination goes along with it. Also, extent and coherence are often represented within the actions. That is related to the idea of developing integrated and connected design strategies that form a network and follow a consistent design approach rather than focusing merely on local interventions. Consequently, the feeling of extent and coherence is enhanced when experiencing restorative green.

In the category of urban ecosystem services, the main areas of impact are cooling and clean air, followed by infiltration and retention, and biodiversity. With heat stress being a major challenge in cities and a growing risk due to climate change, measures for cooling are highly important. The majority of the strategic actions contribute to reducing heat stress by increasing the amount of greenery, reducing sealed surfaces, and choosing appropriate species. Furthermore, an increase in urban nature and a reduction in traffic lead to improved air quality. By opening up paved areas and transforming rooftops and streets, additional areas for rainwater infiltration and retention are created. Moreover, the design aims to develop restorative environments that contribute to increased biodiversity due to planting a variety of (local) species and creating connected ecosystems for wildlife corridors.

On the other hand, the strategic actions exert the least impact on food and fresh water. Food is provided when creating community gardens or planting edible plants, which can only be implemented at suitable locations. The requirements to contribute to the provision of food are thus limiting. A similar case occurs with the supply of fresh water, which is related to the installation of drinking fountains and water pumps. These are local interventions that do not apply to all strategic actions.

Another focal point for the evaluation of the assessment is to investigate the action with the least impact in all fields. Here, action 3.3 "Pedestrian and bike bridge connecting the waterfronts" stands out. The limited effect on various criteria stems from its nature as an intervention aimed at connecting the waterfronts, rather than creating a new restorative environment.

*Further assessment possibilities*
Restorative urban design aims for inclusive environments that provide the same opportunities and accessibility regardless the age, gender, ethnic identity, physical and cognitive variation, and socioeconomic status (Roe & McCay, 2021).
Consequently, the actions and patterns could be assessed based on their impact on different age groups like children, the working population, and the elderly. Since different groups require varying needs for fulfilled well-being, the actions might address different users. Aspects of investigation could address the times of usage depending on differing daily routines, varying interests and possibilities in the level of activity and rest, and the accessibility and distances to restorative environments. Moreover, the interventions hold different opportunities for play, which addresses predominantly children but lifelong playing can foster the well-being of adolescents likewise. Other criteria could include different requirements in terms of noise, resting possibilities in the shadow, or options for taking a break from work.
While multi-functional spaces invite various user groups and hold the potential to provide inclusive environments, conflicts among users based on their different needs may arise as well and need to be considered.

*Conclusion*
To conclude, the assessment scheme provides an useful overview over the impact of the strategic actions and related patterns. Therefore, it holds the potential to support the decision-making process of stakeholders when deciding on prioritising specific actions during the implementation of the design.

# 5.5 TRANSFER OF DESIGN STRATEGIES

The previous chapter illustrated how restorative urban nature can be developed within the chosen area of Moabit West. Since restorative environments and daily urban nature contacts are not restricted to a specific location but should be established in various settings of Berlin, the following section proves the transferability of the design interventions to the other two focus areas.
By applying the pattern language "Restoration with urban nature" and the guidelines for restorative urban nature to the areas of Flughafenkiez and Helmholtzkiez, possible similarities and differences become evident.

For a better comparison, a SWOT analysis was done for the two areas as well. After deriving potentials and challenges, the areas are compared with the design location of Moabit West. Finally, the systemic sections show the application of suitable patterns.



## SWOT FLUGHAFENKIEZ

### STRENGTHS

Large UGS in proximity (Tempelhofer Feld, Hasenheide)
Urban gardening at Rollberg area
Mixed-use area with commerce and gastronomy
Multicultural population

### WEAKNESSES

High population density
Undersupply of UGS
Main streets with high traffic: noise and air pollution
Vandalism, trash, disrepair and drug consumption in public spaces

### OPPORTUNITIES

Cemetery within the area as potential restorative environment
Playgrounds (Boddinplatz and Sasarsteig)
Boddinplatz potential for qualification
Rollberg area with different functions, including a museum and public square

### THREATS

Consequences of climate change
Lacking awareness


[Fig. 148] SWOT Flughafenkiez

## SWOT HELMHOLTZKIEZ

### STRENGTHS

Former cemetery park Pappelallee

Helmholtzplatz as central meeting place with several functions

Historic renovated building structure contributes to aesthetic neighbourhood

### WEAKNESSES

High population density

Undersupply of UGS

Lacking public furniture (bike racks, benches)

### OPPORTUNITIES

Partly already green facades and planters existing

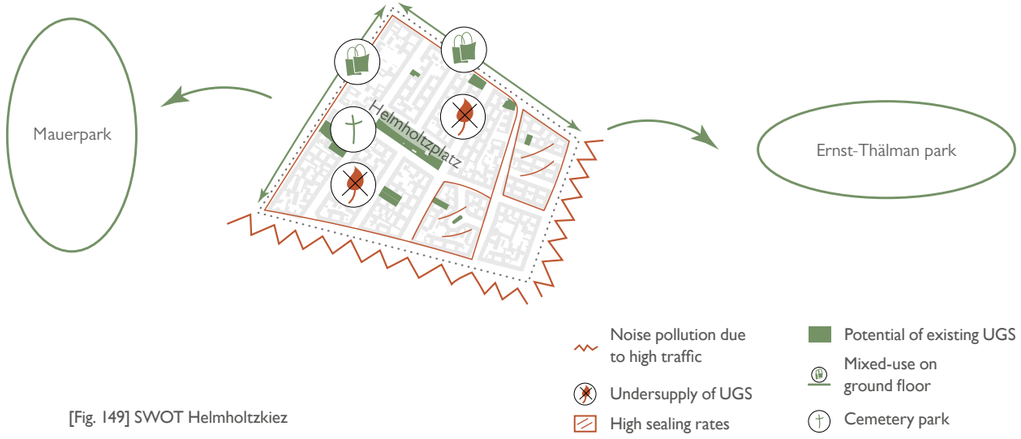
Several urban green spaces (predominantly playground function)

Adjacent UGS (Mauerpark, Ernst-Thälman-Park

### THREATS

Gentrification and increasing densification

Consequences of climate change




[Fig. 149] SWOT Helmholtzkiez



Several design ideas can be transferred to the areas of Flughafenkiez and Helmholtzkiez. Starting with the transformation of the streets, the principles of traffic-reduced streets and bike streets are applicable here as well. Since heavily trafficked roads are present at the boundaries of all areas, it is important to reduce traffic here. The two areas dominated by residential use would also benefit from transforming residential streets into bike streets with green encounter zones. Additionally, it is necessary to install more bike racks and benches.

Moreover, an important part of the design for Moabit West is the waterfront development. Although the other two areas do not have waterfront access, there are large green spaces in the immediate vicinity that can be enhanced in terms of accessibility and connections. Furthermore, the St. Jacobi Cemetery, which is currently still in operation but can be transformed into a restorative environment, borders the Flughafenkiez. A successful example is the cemetery located further south with the community garden "Prinzessinnengärten". Also, in the neighbourhood of Helmholtzkiez, a former cemetery has already been converted into a park, which contributes significantly to restoration.

Due to the dense building structure with scarce available open spaces, the development of new green spaces in the other two focus areas is challenging. So can no large parking lots with potential for transformation be found at Helmholtzkiez. However, at Flughafenkiez, existing parking areas in the Rollbergareal offer the potential for conversion into green spaces. Nevertheless, in both areas, there is room for improving the existing green spaces by transforming them into restorative environments with stronger ecological quality.

Unlike in Moabit West, where predominantly industrial areas are present, no adaptation of industrial areas is necessary in the other two areas. Instead, the focus lies on improving residential buildings and courtyards through the use of green facades, rooftop gardens, and green courtyards with meeting spaces.

A particular challenge is found in the Flughafenkiez in Neukölln, where solutions are needed for the problem of litter and vandalism in public spaces. Here, it is important to raise awareness and involve the population in the implementation and maintenance of interventions. Through early participation and taking responsibility, identification can be strengthened, and ideally, destruction can be prevented. Another possibility is to collaborate with educational institutions and social institutions to strengthen awareness of urban nature.

To conclude, the qualification and connection of existing UGS and the transformation of street scapes to attractive places to stay are in focus for the development of restorative urban nature.

## APPLICATION OF PATTERNS TO FLUGHAFENKIEZ

- G1 Nature around the corner
- G2 Green corridor
- G3 From strangers to friends
- G4 All in one

- A2 Plant with me
- A3 Sit with me
- A4 A tree friend

- E1 Cool down
- E3 Open up!
- E4 Leftovers
- E6 Less cars, less stress
- E8 Rest in peace

- B1 Free pee
- B2 Free drink
- B3 Materials matter

- S1 Green view

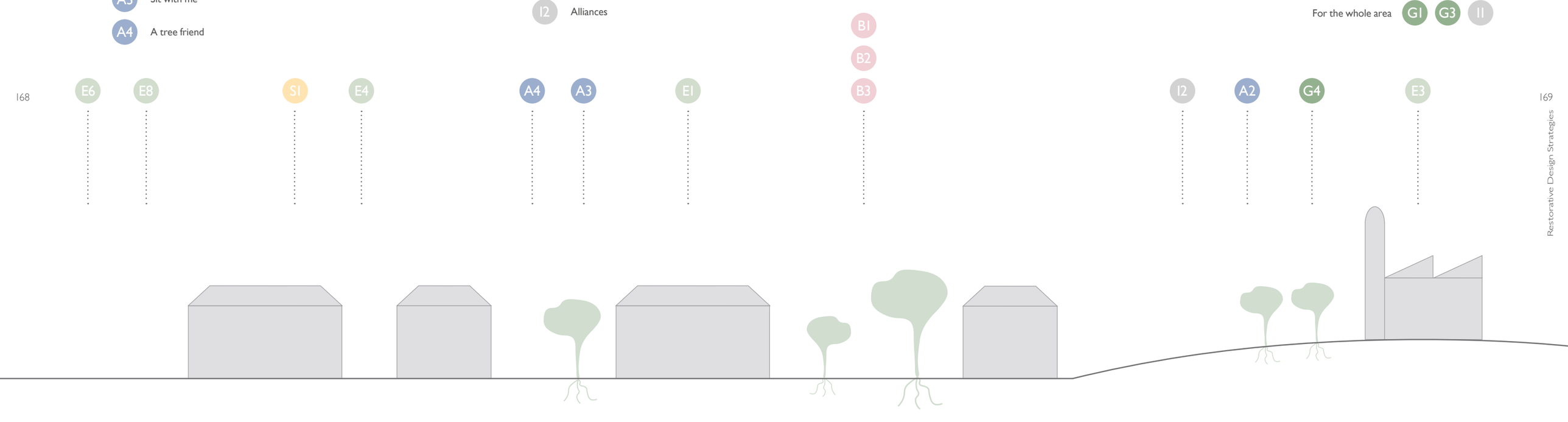
- I1 What do you think?
- I2 Alliances







For the whole area G1 G3 I1




[Fig. 150] Systemic section Flughafenkiez

## APPLICATION OF PATTERNS TO HELMHOLTZKIEZ

- G1 Nature around the corner
- G2 Green corridor
- G3 From strangers to friends

- A1 Fit with nature
- A2 Plant with me
- A3 Sit with me
- A4 A tree friend

- E1 Cool down
- E3 Open up!
- E4 Leftovers
- E6 Less cars, less stress
- E8 Rest in peace

- B1 Free pee
- B2 Free drink

- S1 Green view
- S5 Sound of nature

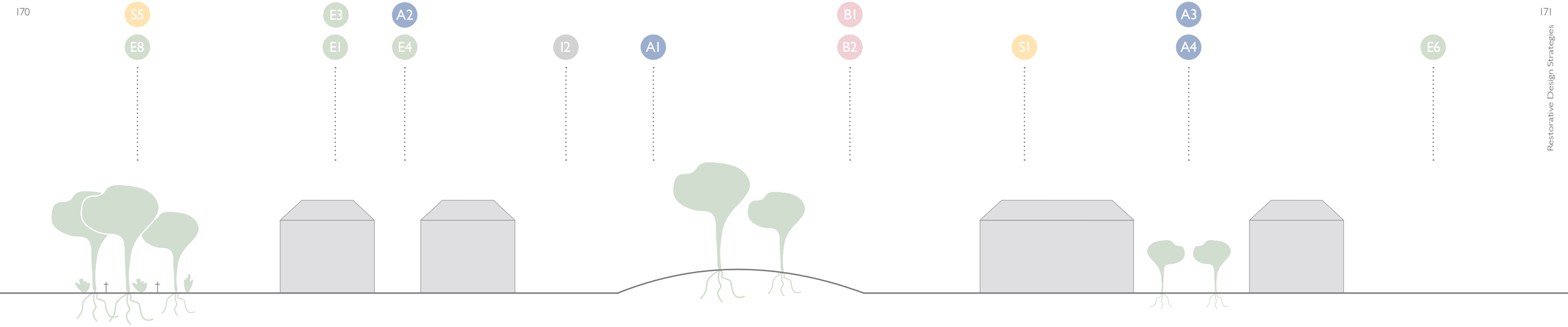
- I1 What do you think?
- I2 Alliances

For the whole area G1 G3 I1









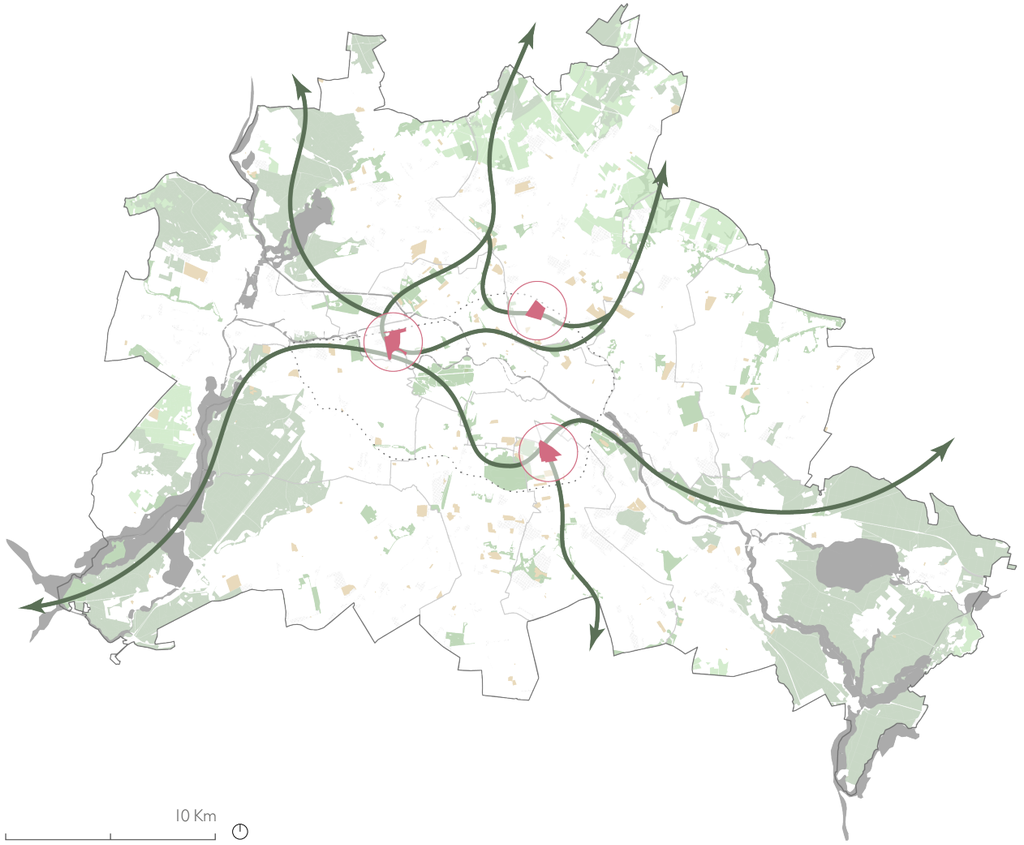

[Fig. 151] Systemic section Helmholtzkiez

## DEVELOPING A CITY-WIDE GREEN-BLUE NETWORK

After applying the design principles and guidelines for restorative urban nature to the other two focus areas, the green-blue network is growing towards a connected structure that starts to cover greater parts of the city. By taking the three areas as a starting point, the possible development of a green metropolitan area with an emphasis on personal and ecological well-being is illustrated.

In a further process, the ideas could be applied to other parts of the city, leading to a growing and integrated green-blue infrastructure.






[Fig. 152] Green-blue network on city scale

## 5.6 CONCLUSION - RESTORATIVE DESIGN STRATEGIES

Lastly, the fifth chapter translated the patterns based on the theoretical background to applicable design strategies for restorative environments and improved urban climate at the case study locations. Starting with the input of the co-creation workshop and previous analysis, a SWOT analysis helped identifying the main potentials and challenges of the design area Moabit West. Following, goals for the design were set that lead to the design concept of elaborating a green-blue net for restoration and encounter.

By applying patterns and guidelines for restorative urban nature, a design and implementation strategy, consisting of three phases with main actions and different stakeholders, was developed. Furthermore, the design for Moabit West was evaluated based on its contribution to several criteria of restoration and urban ecosystem services.

Lastly, the principles were applied to the other two focus areas of Helmholtzkiez and Flughafenkiez. Here, similar conditions but also different focal points appear that show the adaptability of the design and pattern language.

# CONCLUSIONS

Green city?
Behmstraße, Berlin

# 6.1 CONCLUSION

Life in cities affects personal and ecological well-being. So are the consequences of growing urbanisation and climate change tangible in urban settings. Within the urbanism practise, the necessity is growing to find design and planning solutions to increase the quality of life for all living organisms in cities.
To find answers to that challenge, the graduation project explored the main research question:

*How can urban green spaces in Berlin contribute to creating restorative environments that improve the personal well-being of residents as well as the quality of ecosystem services?*

During researching answers to that question, several sub-questions were tackled, that are going to be summarised first. Lastly, answers to the main research question are provided.

To begin with, the first question was posed:

*Which factors in the urban environment influence personal well-being?*

In the project, personal well-being consists of the three layers of mental, physical, and social well-being that contribute to an overall state of health. However, several urban stressors influence personal well-being, leading to an experience of stress, and mental fatigue. Among the stressors are factors of the urban environment, including density, crowding, traffic, housing conditions, garbage, graffiti and disrepair, and the accessibility and availability of urban green spaces. Moreover, stressors from urban conditions like air pollution, noise, and heat stress affect well-being. On the other hand, nature contacts and exposure to green spaces facilitate stress relief and improve well-being.
Also, aspects of social-economic circumstances and environmental justice play a role, yet it has to be noted that the personal conditions of an individual are less in the foreground within the project.

To sum up, personal well-being is a multi layered concept that is influenced by a variety of factors of the urban environment. Tackling all aspects to the same extent is often not possible but rising awareness about the wide-ranging influence of the urban environment on personal well-being contributes to suitable and encouraging planning decisions.

Secondly, the concept of personal well-being got transferred to the case study location of Berlin by examining the following question:

*What is the current state of personal well-being of the people in the metropolitan region of Berlin and in the focus areas?*

Due to missing data on the health of the inhabitants of Berlin, the question can only be answered in a more generalised way by looking at data on several stressors and socio-economic factors. Thus, an accumulation of well-being affecting factors is found in the central, inner-city districts. Here, the highest population densities as well as an undersupply of urban green spaces per inhabitant occur. Additionally, here the residents are facing the greatest unjust consequences of environmental justice as these areas are the most pressured by air pollution, noise, and heat stress while showing the highest unemployment rates, migration backgrounds, and lowest life expectancy.

However, these data are not representative of entire districts and statements must be made with caution. When looking at the focus areas, it is evident that all three areas are characterised by high population densities, lacking green spaces, and high rates of sealed surfaces which indicates high heat stress during warm periods. Furthermore, the areas of Moabit West and Flughafenkiez Neukölln are defined by challenging socio-economic factors.

Concluding, it can be said that the analysis of different stressors allows for conclusions regarding the current state of well-being of Berlin's inhabitants, yet a variety of personal factors could not be part of the study. Therefore, the conditions may seem unfavourable for well-being while the personal perception of a person may differ.

In order to improve well-being, the third question tackles the possibilities at hand:

*What are the characteristics of restorative environments and how can they be translated into design solutions?*

Restorative environments are characterised by the contribution to well-being and stress reduction while being part of natural environments. Fostering involuntary attention and the activation of different senses, restorative environments help to recover from mental fatigue.
The development of the pattern language "Restoration with Urban Nature" and the guidelines for restorative urban nature formed the bridge between theory and practice. By applying the patterns and guidelines to the design location of Moabit West, design solutions for restoration and the urban climate were developed.

Furthermore, the design solutions focus on different aspects of restoration like activity, encounter, resting, and daily nature contact to improve well-being. At the same time, the interventions contribute to ecological well-being, biodiversity, and climate adaptation.
Overall, the pattern language helped identify the needs and measures for establishing restorative environments in Berlin and specifically in the focus areas.

Since restorative environments are found within natural environments, a part of the analysis was dedicated to the current situation of the urban green spaces in Berlin by asking:

*What is the status quo of urban green spaces*

*in Berlin regarding their quality, quantity, and accessibility?*

Berlin is with a share of 40-44% of green spaces a very green city, yet these spaces are unequally accessible and distributed within the city. On the eastern and western edges, the majority of forest structures are located whereas the inner-city districts are undersupplied in terms of urban green spaces close-to-home.

Nevertheless, the city is characterised by a variety of urban green spaces, including parks, urban forests, allotment gardens, cemeteries, and waterfronts. Also, a high diversity of species can be found within the city, especially on former railway tracks and underused areas (Brachen).



Consequently, the green (and blue) network of the city holds high potential for development and qualification, considering the high diversity of urban nature in Berlin.

As urban nature plays an integral role in providing benefits for personal and ecological well-being, the fifth question deals with the perception of the residents regarding that topic:

*How do the residents in the chosen neighbourhoods experience the relationship between their personal well-being and urban nature?*

For answering the question, the fieldwork within the focus areas gave valuable input. Given the fact that the conversations with residents and employees of institutions within the focus areas represent merely a part of society or display personal opinions, the collected informations are to a limited extent representative.

However, the fieldwork showed a general recognition of the importance of nature for well-being among the residents. Therefore, the majority formulated a need for urban green spaces in the vicinity to home and a lack of qualitative and suitable natural areas was identified. The street conversations revealed also differences in the perception based on cultural backgrounds, which shows the importance of considering different needs when planning and designing for society.

The diversity of society is also reflected in the variety of stakeholders involved in the realisation of a project. Thus, to realise the design interventions, the next question was tackled:

*Which stakeholders, policies, and guidelines are needed for the implementation of the design interventions into the planning practice to consequently raise awareness for the importance of urban nature?*

The analysis of current plans and policies of Berlin revealed the ongoing awareness of urban nature, climate protection, and climate adaptation. Consequently, there are several instruments with concrete projects and measures available to steer the sustainable development of the urban green spaces in the city. To mention are here the Urban Development Plan Climate 2.0, the program for energy and climate protection 2030, the charter of Berlin Urban Nature with action program, the Strategy City Landscape, and several protective programs.

Also, different funding programs facilitate the development of urban green spaces and improved urban climate. Nonetheless, the aspect of personal well-being is often only a small part of the considerations and needs to be highlighted within the planning instruments. Therefore, the guidelines for restorative urban nature add value to the existing instruments.

Regarding the inclusion of different stakeholders, it is important to think interdisciplinary and see the whole picture. When developing restorative design interventions, stakeholders from various disciplines need to get involved to ensure the consideration of all needs and interests. In addition, stakeholders can benefit from different fields of expertise.

Lastly, the impact of the design interventions needs to be assessed, leading to the question:

*How can the design be evaluated based on its contribution to urban ecosystem services?*

As a last step, the design for a restorative and climate adaptive Moabit West is evaluated based on its contribution to the restoration and ecosystem services. With ecosystem services, the environment provides benefits for well-being and the climate. Here, a division can be done between supporting, provisioning, regulating, and cultural ecosystem services.
For the assessment, the focus lies on the contribution of the interventions to activity, encounter, education, cooling, clean air, noise reduction, infiltration and retention, biodiversity, food, and fresh water. A three units scale from low to high was used to evaluate the effect.

By evaluating the contribution of the design interventions to ecosystem services, the value for personal and ecological well-being becomes evident. Finally, the evaluation contributes to raising awareness and defending design decisions.

*Answering the main research question*

Taking the answers to all supporting sub-questions together, the main research question can be answered likewise. The research project has illustrated the importance of urban green spaces for restoration and climate adaptation to consequently improve personal and ecological well-being. By applying the knowledge of different restoration theories to the urban planning and design field, the development of restorative environments is fostered.
Therefore, it is important to consider various factors when creating restorative urban nature.

Taking into account restorative elements like possibilities for resting, encounter, activity, extent, compatibility, fascination, coherence, the feeling of being away, and the activation of several senses contributes to the restorative potential of urban green spaces.

In addition, restorative environments are not merely intended to improve personal well-being, yet the ecological system is considered as well. When planning and designing restorative urban green spaces, manifold contributions to ecosystem services increase their quality, leading to benefits for the entire urban environment and its inhabitants.



Given the variety and complexity of urban green spaces in Berlin, diverse opportunities for the creation of restorative environments arise. These are ranging from transformations of streetscapes, the adaptation of buildings to the fostering of urban wilderness, the qualification of parks and waterfronts, and the establishment of community gardens.

In conclusion, Berlin's green potential for the creation of restorative environments and the provision of qualitative ecosystem services is complex and multilayered. With interventions on different scales and the connection of strategies, the provision of daily urban nature contact can be enabled for everyone. Finally, the restorative design strategies lead to an urban environment that promotes personal and ecological well-being

The potential of nature
Campus, TU Delft

## 6.2 DISCUSSION OF THE RESULTS

The previous section demonstrated how the graduation project addressed the question of how Berlin's urban green spaces contribute to creating restorative environments, enhancing the personal well-being of residents, and improving the quality of ecosystem services. In addition to the developed guidelines for restorative urban nature, the pattern language 'Restoration with Urban Nature,' one of the project's outcomes, offers a valuable tool for establishing restorative environments in Berlin. While the pattern language focuses on Berlin's specific conditions, it is designed to be adaptable and transferable to other urban contexts. Furthermore, it is open to expansion and can be complemented in the future. While this flexibility is a strength, the project also has its limitations.

Within the thesis, the application of the patterns in the form of elaborate designs was only carried out for one location. Additionally, two other locations were used for comparison, idea transfer, and pattern testing. However, the limited number of locations covers only a selection of urban conditions. Since all three locations are situated within the city center, it would be worthwhile to investigate suburban areas and large-scale housing estates as well. This would allow for comparisons and drawing conclusions that encompass the entire city



## 6.3 RECOMMENDATIONS

*Recommendations for Berlin's authorities*
As this thesis investigates the current conditions of well-being and restorative environments in Berlin, several recommendations can be made to the city authorities. The project has highlighted the various types of urban green spaces in Berlin, along with their qualities and deficiencies. It is crucial to increase the potential of urban nature in all its diversity, strengthening existing positive aspects while addressing shortcomings through qualifying these places. Additionally, existing instruments and measures at the local, regional, and national levels provide a valuable foundation for establishing restorative environments. However, consistent and expedited implementation of theoretical ideas is necessary. Berlin's authorities must prioritise the development of a comprehensive green network that extends throughout the entire city and beyond, ensuring access to nature from residents' front doors to regional green structures.

Furthermore, to enhance urban green spaces and create restorative environments that benefit both humans and nature, it is important to foster interdisciplinary collaboration among various stakeholders. This collaboration should include planners from different departments, sociologists, residents, landscape architects, urban designers, NGOs, and educational institutions. Encouraging exchange between specialists and laypersons can lead to fruitful discussions and better outcomes that satisfy all parties involved. Above all, the well-being of both humans and nature should be at the forefront of every planning decision.

Equally essential is raising awareness among society as a whole by educating about the role of nature in promoting well-being. Starting at a young age, it is crucial to teach children about the importance of preserving ecosystems and provide opportunities to experience urban nature firsthand which will help them recognise the benefits of nature and positively influence their future development.

*Suggestions for urbanists*
In the field of urbanism, the correlation between the urban environment and personal and ecological well-being has not yet received sufficient attention. It is crucial, particularly within university education, to prioritise teaching about well-being and restorative environments as part of the urbanist's responsibility when designing and planning for society. This entails creating an increased awareness of the urgency in considering the interconnected relationship between urban conditions, the well-being of residents, and the importance of urban nature in enhancing the quality of life for both human and non-human participants in cities.

Urbanists rely on collaboration with various stakeholders and political decisions. However, it remains their responsibility to effectively inform, convince, and contribute with their expertise in the most impactful manner.

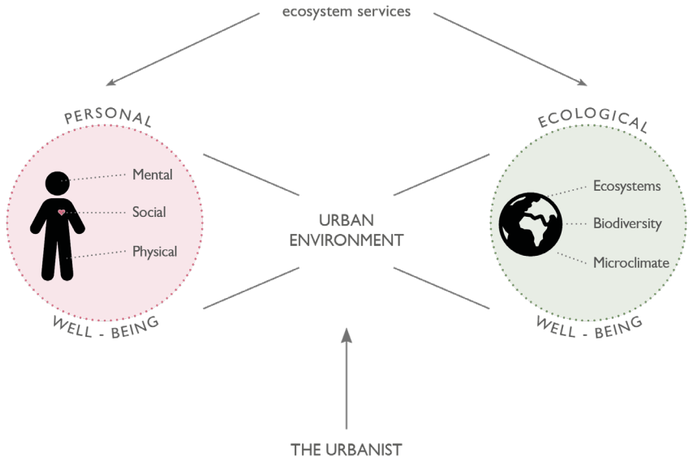
Urbanists shape the built environment and can intervene in the public space. Thus, here lies the leverage point to make decisions that positively influence personal and ecological well-being.

*Link to social studies*

In order to gain more in-depth insights and data on personal well-being and the perceived relationship between well-being and nature contact, a social study could be conducted.
By means of a survey or questionnaire that is based on existing assessment tools like the WHO-5 Well-Being Index, the WHOQOL (WHO Quality of life questionnaire) or the SRQ-20 (the Self-Report Questionnaire 20) data could be collected and translated into the urbanism practice (King, 2018). Moreover, interviews with professionals from the fields of psychology and social studies may offer significant findings.

Connecting the research done at the graduation project with further social studies fosters interdisciplinary cooperation and acknowledges the importance of well-being while making planning and design decisions. Also, the results of the ongoing citizen science project "Your emotional city" by an interdisciplinary team, that investigates the perception and linked emotions towards different places in cities, could be linked to the results of the graduation project (Futurium, 2023).






[Fig. 153] Correlation between well-being, ecosystem services and urbanism

*Restorative transformation of industrial sites*

A significant share of land at the design location Moabit West is characterised by highly sealed up industrial sites. Investigating how to transform these areas in the context of urban nature, climate adaptation, and urban manufacturing to restorative, mixed-used sites with connections to the adjacent residential areas could be a project on its own. It would be interesting to develop patterns based on the pattern language "Restorative Urban Nature" that addresses the transformation and adaptation of inner city, industrial areas to create working environments that integrate restorative urban nature.

Since a green view increases productivity, well-being, and job satisfaction (Kaplan, 1993; Gilchrist et al., 2015) the transformation of the industrial sites is highly beneficial for the employees while also contributing to the overall urban climate of the area and the perception of the industrial sites by the residents.

In conclusion, further research could tackle the development of climate adaptive and integrated industrial sites that provide restorative environments at Moabit West and are transferable to other urban industrial contexts.

[Fig. 154] AEG turbine factory at Moabit West

# 6.4 REFLECTION - ACADEMIC

**Relation to Urbanism and the Metropolitan Ecologies of Place (MEP) Studio**

As my graduation project topic deals with the positive effects of urban nature on personal and ecological well-being in the context of restorative environments and ecosystem services, manifold relations to the studio topic and Urbanism track can be seen.

To begin with, the MEP studio emphasises the interrelatedness of the human and natural systems which leads to an integrative approach to the research and design. Also, the current challenges for planners and designers resulting from climate change are central in the studio. Related to that, the graduation project focuses on the impact of the built environment on the well-being of human and non-human inhabitants of the city. Additionally, the consequences of climate change on the quality of life in urban areas and the need for climate adaptation are studied to mitigate the negative effects on health and ecosystems.

Moreover, the studio is divided into different focus topics. Here, the themes of Urban Ecology and Biophilic Design are reflected the most in my project. Urban Ecology deals with the relationship between human and non-human species and the environment while acknowledging their interdependency within the complex system (Vink, 2014). That is an important aspect of the project as the connection between the urban environment of Berlin and its various inhabitants is highlighted by examining the correlation between human well-being and nature contact. Furthermore, the biophilia theory by Wilson (1984) states that the human-nature connection is based on a genetic predisposition resulting from the evolutionary process of evolving with nature. Thus, Biophilic Design emphasises the various positive effects of nature on well-being (Beatley, 2014).

Secondly, the topic is related to the master track Urbanism as it investigates the relationship between the urban, social, and ecological layers and aims for an integrative, sustainable, and just development of all three fields. The goal to create inclusive and healthy living conditions in cities for improved liveability and quality of life is at the core of the project, too.

**Advantages and limitations of chosen methods**

The project deals with a complex problem since several interrelated factors influence well-being in cities and different layers of socio-ecological issues are addressed. For tackling such complexity, a non-linear mixed methods approach with a focus on research by design was chosen. The mixed methods approach is characterised by combining qualitative and quantitative data for the research (Creswell, 1999). The advantage of using mixed methods lies in their versatility and comprehensiveness to understand the research problem. While quantitative methods provide statistical data on a large scale, qualitative methods offer an in-depth analysis of individual experiences and attitudes, which can enhance the interpretation of the quantitative data (Creswell, 1999). Thus, quantitative data gathered through spatial and statistical analysis was complemented by qualitative data from literature review and fieldwork. Since the research topic lies not only in Urbanism but is also strongly rooted in the field of Psychology, the chosen methods enabled a profound understanding of the multifaceted problem.

Furthermore, the difficulty lies in translating the theoretical findings into design solutions. Here, the approach of research by design was very helpful. Research by design is understood as an "academic investigation through which design is explored as a method of inquiry" (Roggema, 2016, p. 3) for developing ideas, new knowledge, and spatial solutions. The method is suitable for complex problems, facilitating also unconventional solutions through experimentation.
Additionally, the development of a Pattern Language helped to guide the research to specific problems and combined theoretical background with practical solutions.

*Fieldwork:*
The fieldwork opened up a new perspective on the posed problem and was a very important and helpful method to understand the location and the different interests of the people better.

Nevertheless, it needs to be considered that the fieldwork was done in winter, which influenced the perception of a place and the answers of the interviewees. Furthermore, the outcomes of the street interviews are highly subjective and cannot be generalised, yet they allow for getting an impression. Unfortunately, in the third area, no contact with institutions and professionals could be established due to missing reactions. Thus, a learning outcome is to be flexible by adapting to the circumstances and using different ways for data collection.

*Co-creation workshop*

Participation is often seen as an indispensable part of urban design and planning processes as it allows for the inclusion of different interests and enhances the identification and quality of a project. Therefore, a co-creation workshop offers the possibility for different actors to communicate their needs while providing helpful input for the urbanist. During my co-creation workshop, I learned that the difficulty lies in activating people to take part in such an event. Despite the previously formulated interest, only a small group participated in the end.

I conclude, that there are two aspects to consider. Firstly, it lays in the responsibility of the urbanist to inform the intended audience sufficiently beforehand to raise awareness for the co-creation workshop and evoke interest. In my case, this was done via different online platforms and physical posters in the area. Secondly, often the urbanist cannot influence the willingness of the people to engage themselves since various personal factors may hinder them from taking part in the event.

Another aspect regards the organisation of the workshop. Parts 1-3 went very well and provided insightful ideas. In a future workshop, I would adapt the fourth part to get more feedback on the design by letting people indicate their opinions with stickers or adding their thoughts in written form. In contrast, the chosen setup for this time facilitated merely a limited discussion about the design ideas.

**Problems during data collection**

In the beginning, it was difficult to find data related to mental health, specifically for the case study location. Shifting from merely mental health to personal well-being widened the perspective and different aspects like socio-economic and environmental parameters were taken into account. Hereby, the data became better transferable to a spatial context as well.

Nonetheless, collecting information about the perceived relationship between people's well-being and nature turned out to be difficult because the conducted fieldwork brought only limited insight into that question. For further understanding, a survey might be a suitable method.



**Possibilities to generalise and transfer the results**

The conducted research focuses on the case study location of Berlin, yet the results can be generalised and transferred to other contexts as urban stressors appear in all urban settings. Also, personal and ecological well-being are highly relevant issues that need to be addressed in modern urban planning. Based on the Pattern Language "Restoration with Urban Nature" and the generalised guidelines for restorative urban green spaces, planning and design decisions can be done for various locations with a focus on improved personal and ecological well-being. Consequently, the pattern language is transferable to other urban contexts. However, the recommendations for species may differ depending on the climatic zones.

**Ethical issues in research and possible application in practice**

Assessing people's well-being needs to be done sensitively since it deals with very personal circumstances that not everybody might want to share. As the data is very individual, generalisation is difficult and only possible to a limited extent. Furthermore, there is the risk of self-reported bias or misunderstandings.

The findings of the research are already tested within the co-creation context. Moreover, the design strategies allow for practical, short-term implementations but can also be incorporated into bigger-scale visions.

*Green gentrification and green washing*

All proposed interventions follow the best intentions for enhancing the well-being of the addressed users. Nonetheless, improving the urban environment through the qualification or implementation of green spaces can lead to green gentrification. Green gentrification occurs when greening interventions change a former underdeveloped neighbourhood that becomes attractive to higher-income residents. Consequently, the availability of affordable housing decreases, and the original inhabitants might feel less connected to the area. As a result, the interventions could create the opposite effect: instead of increasing personal well-being, the conditions are deteriorating for parts of society (Jelks et al., 2021).

Another risk is green washing: it can occur when a project is marketed as being environmentally friendly, but in reality, it has little to no impact on the environment. By promoting transparency and accountability in form of assessment criteria, a truly positive impact on the environment can be ensured.

## 6.4 REFLECTION - PERSONAL

Working on a project for a long period taught me the importance of organisation and structure. Hereby, the presentations as milestones were helpful. Also, I learned that it is essential to work on different parts simultaneously to ensure everything progresses at the same level. However, I sometimes struggled by focusing too much on details while doing literature research or design. Nonetheless, this project showed me that I can work consistently and organised.
I take into the future that it is important to plan each step to achieve within a specific timeframe. Also, I enjoyed organising the co-creation workshop and the exchange with different actors that contributed to its realisation. It gave the project a real-life connection, which I value a lot.
Finally, I reflected on the research questions and realised that seven questions were very ambitious, and not all of them could be answered to the same extent within the given timeframe of the graduation project.

*My values as an urbanist*
Looking back at my application for the master's program at the TU Delft two years ago, I realised that the foundation of my main values as an ongoing urbanist was set already back then. Up until today, I believe that the development of urban and rural areas has to follow responsible, future-oriented, and participatory planning. Furthermore, my goals are to actively contribute to the improvement of cities under the aspect of sustainability by interdisciplinary collaboration since I am aware of the wide-ranging influence of planning on people's healthy lives, as well as the ecological impact.
Additionally, new values gained importance for me. In the course of the master's, I became more aware of the aspects of social and environmental justice. Learning about the interrelatedness of urbanism and justice expanded my understanding of the versatile and influential role of an urbanist. Related to that is the realisation that urbanism is highly political and depends on political decisions while I see a lot of responsibility as an urbanist to convince and influence decision makers based on my expertise.

Moreover, having conducted my own first co-creation workshop and thus gathered experiences with participation that also showed the difficulties of participatory planning and design, I still believe in the importance of co-creation and inclusive processes. Thus, I think it is necessary to find ways to make participation more tangible and inviting, also by using the various possibilities of online tools.

Lastly, including the aspect of ecology and the importance of nature in the urban setting was already a very relevant value for my idea of being an urbanist. However, through the master's program and the graduation project I reached a significantly deeper knowledge about these topics, which strengthened my motivation to strive for a social-ecological approach for my future urbanism practises.



Nature walks for study breaks
Haagse Bos, Den Haag

# REFERENCES


Adli, M., Berger, M., Brakemeier, E. L., Engel, L., Fingerhut, J., Gomez-Carrillo, A., Hehl, R., Heinz, A., H, J. M., Mehran, N., Tolaas, S., Walter, H., Weiland, U., & Stollmann, J. (2017). Neurourbanism: towards a new discipline. *The Lancet Psychiatry, 4(*3), 183–185. https://doi.org/10.1016/s2215-0366(16)30371-6

Adli, M., & Schöndorf, J. (2020). Macht uns die Stadt krank? Wirkung von Stadtstress auf Emotionen, Verhalten und psychische Gesundheit. *Bundesgesundheitsblatt, 63* (8), 979 – 986. g/10.1007/s00103-020-03185-w.

Alexander, C., Ishikawa, S., & Silverstein, M. (1977). *A pattern language : towns, buildings, construction.* Oxford University Press.

Amt für Statistik Berlin-Brandenburg (2022a). *Statistischer Bericht. Wanderungen im Land Berlin 2021* (A III 2 – j / 21). Amt für Statistik Berlin-Brandenburg. https://download.statistik-berlin-brandenburg.de/a3111e6a42d750dd/24f1d58fda39/SB_A03-02-00_2021j01_BE.pdf

Amt für Statistik Berlin-Brandenburg (2022b). *Statistischer Bericht. Einwohnerregisterstatistik Berlin 30. Juni 2022* (A I 5 – hj 1 / 22). Amt für Statistik Berlin-Brandenburg. https://download.statistik-berlin-brandenburg.de/b62ab794a3b687b0/580dc2cb49e5/SB_A01-05-00_2022h01_BE.pdf

Beatley, T. (2016). *Handbook of Biophilic City Planning and Design.* Island Press.

Blau, M., & Fingerman, K. L. (2009). *Consequential strangers: The power of people who don't seem to matter...but really do.* W W Norton & Co.

Böhm, J., Böhme, C., Bunzel, A., Kühnau, C., Landua, D., Reinke, M. (2016). *Urbanes Grün in der doppelten Innenentwicklung*. In Bundesamt für Naturschutz (Ed.), Bfn-Skripten 444. (pp. 1-270). Bundesamt für Naturschutz.

Breuste, J., Artmann, M., Ioja, C., & Qureshi, S. (Eds.). (2020). *Making Green Cities. Cities and Nature*. https://doi.org/10.1007/978-3-030-37716-8

Bundesministerium für Gesundheit. (2022). *Geschlechtsspezifische Besonderheiten in der Gesundheitsversorgung, Prävention und Gesundheitsförderung.* Retrieved January 22, 2023, from https://www.bundesgesundheitsministerium.de/ministerium/ressortforschung-1/handlungsfelder/forschungsschwerpunkte/geschlecht-und-gesundheit.html

Burton, I. (1990). Factors in Urban Stress. *The Journal of Sociology & Social Welfare, 17* (1), 79-92. https://scholarworks.wmich.edu/jssw/vol17/iss1/5

Capio, C. M., Sit, C. H. P., & Abernethy, B. (2014). Physical Well-Being. In A. C. Michalos (Ed.), *Encyclopedia of Quality of Life and Well-Being Research*. (pp. 4805-4807). Springer. https://doi.org/10.1007/978-94-007-0753-5_2166

Creswell, J. W. (1999). Mixed-Method Research. In G.J. Cizek (Ed.), *Handbook of Educational Policy.* (p.455-472). Academic Press.

Coppel, G., & Wüstemann, H. (2017). The impact of urban green space on health in Berlin, Germany: Empirical findings and implications for urban planning. *Landscape and Urban Planning, 167*, 410–418. https://doi.org/10.1016/j.landurbplan.2017.06.015

de Roode, M. (2021). *Compact Nature for Compact Cities: Towards an urban nature network in streets and on buildings that enhances ecological values and well-being, a Rotterdam case study.* [Master's thesis, Delft University of Technology]. http://resolver.tudelft.nl/uuid:ef7632ca-6d9d-4de0-a249-5d08bd935164

Fischer, L. K., & Kowarik, I. (2018a). Urbane Artenvielfalt ist beliebt! Gesellschaftliche Unterstützung für eine vielfältige Natur im besiedelten Bereich. *GIT Labor-Fachzeitschrift 12*, 24-27. https://www.researchgate.net/publication/331210772

Fischer, L. K., & Kowarik, I. (2018b). *How people value biodiversity in urban landscapes: Assessing the people-nature intersection in cities*. In V. G. Sychev & L. Mueller (Ed.) Novel methods and results of landsca-pe research in Europe, Central Asia and Siberia (pp. 66-69). Russian academy of scienes.

Fleck, A. (2022). *How Green Are The Capitals of Europe?* Statista. https://www.statista.com/chart/27950/the-greenest-cities-of-europe/

Futurium. (2023). *Deine emotionale Stadt.* https://futurium.de/de/deine-emotionale-stadt

Gehl, J. (2010). *Cities for people.* Island Press.

Gilchrist, K., Brown, C., & Montarzino, A. (2015). Workplace settings and wellbeing: Greenspace use and views contribute to employee wellbeing at peri-urban business sites. *Landscape and Urban Planning, 138*, 32–40. https://doi.org/10.1016/j.landurbplan.2015.02.004

Grouzet, F. M. E., & Lee, E. S. (2014). Ecological Well-Being. In A. C. Michalos (Ed.), *Encyclopedia of Quality of Life and Well-Being Research*. (pp. 1784-1787). Springer. https://doi.org/10.1007/978-94-007-0753-5_3966

Haeupler, H. (1974). Statistische Auswertung von Punktrasterkarten der Gefäßpflanzenflora Süd-Niedersachsens. Scripta Geobotanica VIII. 141 S. *Feddes Repertorium, 87(*1–2), 158–161. https://doi.org/10.1002/fedr.19760870114

Halpern, D. (1995). *Mental health and the built environment. More than Bricks and Mortar?* Taylor & Francis.

Hartig, T. (2007). Three steps to understanding restorative environments as health resources. In C. Ward Thompson & P. Travlou (Eds.), *Open space: people space.* (pp. 163-181). Oxon: Taylor & Francis.

Hartig, T., Catalano, R., Ong, M., & Syme, S. L. (2013). Vacation, Collective Restoration, and Mental Health in a Population. *Society and Mental Health, 3*(3), 221–236. https://doi.org/10.1177/2156869313497718

Jenkinson, C. (2023). *Quality of life*. Britannica. https://www.britannica.com/topic/quality-of-life

Jelks, N. O., Jennings, V., & Gobster, P. H. (2021). Green Gentrification and Health: A Scoping Review. *International Journal of Environmental Research and Public Health, 18*(3), 1-23. https://doi.org/10.3390/ijerph18030907

Kabisch, N., & Haase, D. (2014). Green justice or just green? Provision of urban green spaces in Berlin, Germany. *Landscape and Urban Planning, 122,* 129–139. https://doi.org/10.1016/j.landurbplan.2013.11.016

Kaplan, S. (1992). The restorative Environment: Nature and Human Experience. In D. Relf (Ed.), *The Role of Horticulture in Human Well-Being and Social Development.* (pp. 134-142). Timber Press.

Kaplan, R. (1993). The role of nature in the context of the workplace. *Landscape and Urban Planning, 26* (1–4), 193–201. https://doi.org/10.1016/0169-2046(93)90016-7

Kaplan, R., Kaplan, S., & Ryan, R. L. (1998). *With people in mind: design and management of everyday nature*. Island Press.

Keyes, C. L. M. (1998). Social well-being. *Social Psychology Quarterly, 61*(2), 121–140. https://doi.org/10.2307/2787065

King, J. (2018). *Measuring mental health outcomes in built environment research: Choosing the right screening assessment tools*. Urban Design/ Mental Health. https://www.urbandesignmentalhealth.com/how-to-measure-mental-health.html

Koene, M. (2018). *Urban Stress: Research into the reduction of urban stress through urban design.* [Master's thesis, Delft

University of Technology]. http://resolver.tudelft.nl/uuid:5b6deb0e-82da-42da-bab2-a998c6a456da

Kowarik, I. (1992). Das Besondere der städtischen Vegetation. *Deutscher Rat für Landespflege Schriftenreihe Heft 61,* 33-47. https://www.researchgate.net/publication/259364097_Das_Besondere_der_stadtischen_Vegetation

Kowarik, I. (2021). Working With Wilderness: A Promising Direction for Urban Green Spaces. *Landscape Architecture Frontiers, 9*(1), 92. https://doi.org/10.15302/j-laf-1-030025

Mace, G. M., Norris, K., & Fitter, A. H. (2012). Biodiversity and ecosystem services: a multilayered relationship. *Trends in Ecology & Evolution, 27*(1), 19–26. https://doi.org/10.1016/j.tree.2011.08.006

Millennium Ecosystem Assessment. (2005). *Ecosystems and Human Well-being: Synthesis*. Island Press. researchgate.net/publication/297563785_Millennium_Ecosystem_Assessment_Ecosystems_and_human_well-being_synthesis

Montgomery, C. (2015). *Happy city: transforming our lives through urban design*. Penguin Books.

Musek, J., & Polic, M. (2014). *Personal Well-Being*. In A. C. Michalos (Ed.), Encyclopedia of Quality of Life and Well-Being Research. (pp. 4752–4755). Springer. https://doi.org/10.1007/978-94-007-0753-5_2148

Naturkapital Deutschland – TEEB DE. (2016). *Ökosystemleistungen in der Stadt – Gesundheit schützen und Lebensqualität erhöhen*. I. Kowarik, R. Bartz, & M. Brenck.

Nuvolati, G. (2014). *Urban Life, Quality of.* In: Michalos, A.C. (eds) Encyclopedia of Quality of Life and Well-Being Research. Springer. https://doi-org.tudelft.idm.oclc.org/10.1007/978-94-007-0753-5_2383

Pauleit, S., Hansen, R., Lindschulte, K., Rolf, W., Bartz, R., Becker, C., & Kowarik, I. (2018). Alles wird grün? Die Chancen von grüner Infrastruktur im Rahmen der Nachverdichtung. In Marschall, I. (Ed.), *BfN-Skripten 498*. (pp. 140 – 153). Bundesamt für Naturschutz.

Popkin, G. (2022). Urban oasis. In Berlin, pioneering research into urban ecology has found surprising biodiversity in the city's green spaces. *Science, 6619* (378), 466-469. https://doi-org.tudelft.idm.oclc.org/10.1126/science.adf5842

Psatha, E., Deffner, A,, & Psycharis, Y. (2011). Defining the quality of urban life: Which factors should be considered? *European Regional Science Association, 51st European Congress*. https://www.researchgate.net/publication/254456851_Defining_the_quality_of_urban_life_Which_factors_should_be_considered

Quartiersmanagement Beusselstraße (QM Beusselstraße, 2023). *Gebietsinfos*. QM Beusselstraße. https://www.qm-beusselstrasse.de/Beussel-und-Huttenkiez/Gebietsinfos

Robert Koch Institut (2021). *Psychische Gesundheit in Deutschland. Erkennen - Bewerten - Handeln. Schwerpunktbericht Teil 1 - Erwachsene*. (Gesundheitsberichterstattung des Bundes). RKI. DOI: 10.25646/8831

Roe, J., & McCay, L. (2021). *Restorative Cities. Urban Design for Mental Health and Wellbeing*. Bloomsbury Visual Arts.

Roggema, R. (2016). Research by Design: Proposition for a Methodological Approach. *Urban Science, 1*(1), 1-19. https://doi.org/10.3390/urbansci1010002

Salmond, J. A., Tadaki, M., Vardoulakis, S., Arbuthnott, K., Coutts, A., Demuzere, M., Dirks, K. N., Heaviside, C., Lim, S., Macintyre, H., McInnes, R. N., & Wheeler, B. W. (2016). Health and climate related ecosystem services provided by street trees in the urban environment. *Environmental Health, 15*(S1). https://doi.org/10.1186/s12940-016-0103-6

Scherer, D., Fehrenbach, U., Lakes, T., Lauf, S., Scherer, D., & Schuster, C. (2013). Quantification of heat-stress related mortality hazard, vulnerability and risk in Berlin, Germany. *DIE ERDE – Journal of the Geographical Society of Berlin, 144,* 238–259. https://doi.org/10.12854/erde-144-17

Seligman, M. E. P. (2011). *Flourish: A visionary new understanding of happiness and well-being.* Free Press.

Senatsverwaltung für Stadtentwicklung und Umwelt SenSu, 2012). *Berliner Strategie zur Biologischen Vielfalt. Begründung, Themenfelder und Ziele*. Senatsverwaltung für Stadtentwicklung und Umwelt. https://www.berlin.de/sen/uvk/_assets/natur-gruen/biologische-vielfalt/publikationen/biologische_vielfalt_strategie.pdf



Senatsverwaltung für Stadtentwicklung und Umwelt (SenSU, 2014a). *Strategie Stadtlandschaft Berlin. Natürlich urban produktiv.* Senatsverwaltung für Stadtentwicklung und Umwelt. https://www.berlin.de/sen/uvk/_assets/natur-gruen/landschaftsplanung/strategie-stadtlandschaft/strategie-stadtlandschaft-berlin.pdf

Senatsverwaltung für Stadtentwicklung und Umwelt (SenSU, 2014b). *Stadtteilentwicklungskonzept. Green Moabit Bericht.* Senatsverwaltung für Stadtentwicklung und Umwelt. https://www.nachhaltige-erneuerung.berlin/fileadmin/user_upload/Dokumentation/Projektdokumentation/Mitte/FG_Moabit_Nordring_Heidestr/D6_Green_Moabit/PDF/Green_Moabit_Bericht.pdf

Senatsverwaltung für Stadtentwicklung und Umwelt (SenSU, 2016). *Stadtentwicklungsplan Klima KONKRET. Klimaanpassung in der Wachsenden Stadt.* Senatsverwaltung für Stadtentwicklung und Umwelt. https://www.stadtentwicklung.berlin.de/planen/stadtentwicklungsplanung/download/klima/step_klima_konkret.pdf

Senatsverwaltung für Stadtentwicklung, Bauen und Wohnen (SenSBW, 2022). *Stadtentwicklungsplan Klima 2.0.* Senatsverwaltung für Stadtentwicklung, Bauen und Wohnen. https://www.stadtentwicklung.berlin.de/planen/stadtentwicklungsplanung/download/klima/StEP_Klima_Broschuere_2022.pdf

Senatsverwaltung für Umwelt, Verkehr und Klimaschutz (SenUVK, 2017). *Landschaftsprogramm. Artenschutzprogramm.* Senatsverwaltung für Umwelt, Verkher und Klimaschutz. https://www.berlin.de/sen/uvk/_assets/natur-gruen/landschaftsplanung/lapro_broschuere_dez_2017_text.pdf?ts=1678444533

Senatsverwaltung für Umwelt, Verkehr und Klimaschutz (SenUVK, 2019a). *Basisbericht Umweltgerechtigkeit. Grundlagen für die sozialräumliche Umweltpolitik* (Basisbericht 2017/18). Senatsverwaltung für Umwelt, Verkehr und Klimaschutz. https://datenbox.stadt-berlin.de/ssf/s/readFile/share/2007/6593154860902717743/publicLink/umweltgerechtigkeit_broschuere.pdf

Senatsverwaltung für Umwelt, Verkehr und Klimaschutz (SenUVK, 2019b). *BEK 2030. Berliner Energie- und Klimaschutzprogramm 2030.* Senatsverwaltung für Umwelt, Verkehr und Klimaschutz. https://www.berlin.de/sen/uvk/_assets/klimaschutz/publikationen/bek2030_broschuere.pdf

Senatsverwaltung für Umwelt, Verkehr und Klimaschutz (SenUVK, 2020a). *Charta für das Berliner Stadtgrün.* Senatsverwaltung für Umwelt, Verkehr und Klimaschutz. https://www.berlin.de/sen/uvk/_assets/natur-gruen/charta-stadtgruen/charta.pdf

Senatsverwaltung für Umwelt, Verkehr und Klimaschutz (SenUVK, 2020b). *Handlungsprogramm Berliner Stadtgrün 2030.* Senatsverwaltung für Umwelt, Verkehr und Klimaschutz. https://www.berlin.de/sen/uvk/_assets/natur-gruen/charta-stadtgruen/handlungsprogramm.pdf

Senatsverwaltung für Umwelt, Verkehr und Klimaschutz (SenUVK, 2021). *Straßenbaum-Zustandsbericht Berliner Innenstadt 2020.* Senatsverwaltung für Umwelt, Verkehr und Klimaschutz. https://www.berlin.de/sen/uvk/_assets/natur-gruen/stadtgruen/stadtbaeume/strassen-und-parkbaeume/zustand-der-strassenbaeume/strb_zustandsbericht2020.pdf

Senatsverwaltung für Umwelt, Mobilität, Verkehr und Klimaschutz (SenUMVK, n.d.). *Ziele und Grundlagen der Klimaschutzpolitik in Berlin.* Berlin.de. https://www.berlin.de/sen/uvk/klimaschutz/klimaschutzpolitik-in-berlin/ziele-und-grundlagen/

Singh, N., Singh, S., & Mall, R. (2020). Urban ecology and human health: implications of urban heat island, air pollution and climate change nexus. *Urban Ecology*, 317–334. https://doi.org/10.1016/b978-0-12-820730-7.00017-3

Statistisches Bundesamt. (2022). *Anteil der Waldfläche in Deutschland nach Bundesländern im Jahr 2021* [Graph]. Statista. https://de-statista-com.tudelft.idm.oclc.org/statistik/daten/studie/438462/umfrage/anteil-der-waldflaeche-in-deutschland-nach-bundeslaendern/

Sukopp, H. (1981). Ökologische Charakteristik von Großstädten.

Ulrich, R. S., Simons, R. F., Losito, B. D., Fiorito, E., Miles, M. A., & Zelson, M. (1991). Stress recovery during exposure

to natural and urban environments. *Journal of Environmental Psychology, 11*(3), 201–230. https://doi.org/10.1016/s0272-4944(05)80184-7

Umweltatlas Berlin. (2017). *Geologische Karte 1:25.000*. https://fbinter.stadt-berlin.de/fb/index.jsp

Umweltatlas Berlin. (2020). V*ersorgung mit wohnungsnahen, öffentlichen Grünanlagen 2020*. https://www.berlin.de/umweltatlas/nutzung/oeffentliche-gruenanlagen/2020/kartenbeschreibung/

Umweltatlas Berlin. (2021). *Einwohnerdichte 2021*. https://www.berlin.de/umweltatlas/nutzung/einwohnerdichte/2021/zusammenfassung/

United Nations, Department of Economic and Social Affairs, Population Division. (2019). *World Urbanization Prospects: The 2018 Revision* (ST/ESA/SER.A/420). https://www.un.org/development/desa/publications/2018-revision-of-world-urbanization-prospects.html

United Nations. (2015). *Transforming our world: the 2030 agenda for sustainable development* (A/RES/70/1). United Nations. https://sdgs.un.org/sites/default/files/publications/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf

WHO. (2005). *Promoting mental health: concepts, emerging evidence, practice* (Summary report). World Health Organisation. https://www.who.int/publications/i/item/9241562943

WHO. (2017). *Urban green spaces: a brief for action*. World Health Organisation. https://www.who.int/europe/publications/i/item/9789289052498

WHO. (2020). *Basic documents. forty-ninth edition (including amendmentsadopted up to 31 May 2019)*. World Health Organisation. https://apps.who.int/iris/handle/10665/339554

WHO. (2023). *What is a healthy city?* Retrieved January 14, 2023, from https://www.who.int/europe/groups/who-european-healthy-cities-network/what-is-a-health-city

Wolfenstein, A. (1914). *Die gottlosen Jahre*. S. Fischer.

Vink, J., Vollaard, P., & de Zwarte, N. (2017). *Stadsnatuur maken. Making Urban Nature*. nai010 publishers.

# LIST OF FIGURES

Fig. 46: Ecosystem Services
By author, based on Millenium Ecosystem Assessment (2005). *Ecosystems and Human Well-being: Synthesis*. Island Press. researchgate.net/publication/297563785_Millennium_Ecosystem_Assessment_Ecosystems_and_human_well-being_synthesis

Fig. 52: Spatial composition
By author, based on Geoportal Berlin (n.d.) Retrieved March 31, 2023 from https://fbinter.stadt-berlin.de/fb/index.jsp

Fig. 53: Geological development
By author, adapted from Senatsverwaltung für Umwelt, Mobilität, Verbraucher- und Klimaschutz Berlin (2008). "Geologische Skizze von Berlin". Retrieved March 23, 2023, from https://www.berlin.de/sen/uvk/umwelt/wasser-und-geologie/geologie/

Fig. 54: Urban Development Plan Klima 2.0 - Spatial vision
Senatsverwaltung für Stadtentwicklung, Bauen und Wohnen (SenSBW, 2022). "Räumliches Leitbild Klima 2.0". Retrieved May 07, 2023, from https://www.stadtentwicklung.berlin.de/planen/stadtentwicklungsplanung/download/klima/StEP_Klima_Raeumliches_Leitbild.pdf

Fig. 56: Environmental justice with focus areas, 2021
By author, based on Amt für Statistik Berlin-Brandenburg (2021b). "Umweltatlas Berlin. Umweltgerechtigkeit: Integrierte Mehrfachbelastungskarte - Berliner Umweltgerechtigkeitskarte 2021/2022". Retrieved September 21, 2022, from https://fbinter.stadt-berlin.de/fb/index.jsp



Fig. 57: Socio-cultural background, 2021
By author, based on Amt für Statistik Berlin-Brandenburg (2021c). "Einwohnerregisterstatistik" (Statistischer Bericht A I 5 – hj 1 / 21). Retrieved October 31, 2022, from https://download.statistik-berlin-brandenburg.de/88db0a250212c1ea/c095a8274709/SB_A01-05-00_2021h01_BE.pdf

Fig. 58: Unemployment, 2021
By author, based on Senatsverwaltung für Wissenschaft, Gesundheit, Pflege und Gleichstellung Berlin (SenWGPG, 2022). "Gesundheits- und Sozialstrukturatlas Berlin 2022". Retrieved November 02, 2022, from (https://www.berlin.de/sen/gesundheit/service/gesundheitsberichterstattung/gesundheit-und-sozialstruktur/)

Fig. 59-60, 68, 73
By author, based on Google Maps (2023). Retrieved March 17, 2023 from https://www.google.nl/maps

Fig. 61: Green-blue infrastructure on neighbourhood scale
By author, based on Open Street Maps (2023) Retrieved March 19, 2023 from https://www.openstreetmap.org/

Fig. 104: Frameworks
By author, based on Roe & McCay (2021). *Restorative Cities. Urban Design for Mental Health and Wellbeing*. Bloomsbury Visual Arts.

And Kaplan & Kaplan (1989). *With people in mind: design and management of everyday nature*. Island Press.

# APPENDIX 1: WORKSHOP (in German)


[Fig. 155] Poster (by author, 2023, distributed in Moabit West together with mobile district work "Moabiter Ratschlag")



**Workshop:**
**Stadtnatur im Alltag für Erholung im Kiez**



! 19.04.2023
Stadtschloss Moabit, Rostocker Str. 32B

Anlass:
Partizipativer Entwurfsworkshop im Rahmen meiner Masterarbeit im Bereich Stadtplanung

Worum geht es?
Entwicklung und Qualifizierung von urbanen Grünräumen zur Bereitstellung von Erholungsräumen, die das persönliche und ökologische Wohlbefinden verbessern

Warum hier?
Hutten- und Beusselkiez stark von Umweltbelastungen betroffen, hohe Einwohnerdichte und beengte Wohnverhältnisse bei fehlendem öffentlichen Grünraum zur Erholung

⟶ aktive Nachbarschaft und bestehende Projekte bieten Potenzial zur Weiterentwicklung des Gebietes mit Blick auf persönliches und ökologisches Wohlbefinden

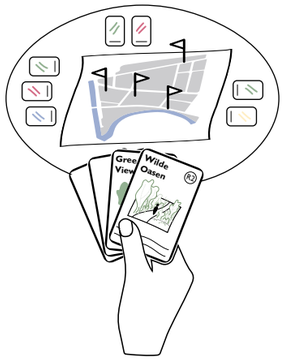
Ziel des Workshops:
- Gemeinsame Erarbeitung von Szenarien für mögliche Erholungsräume mithilfe der Pattern Language „Restoration with Urban Nature/ Erholsame Stadtnatur"
- Wissens- und Erfahrungsaustausch
- Input für die Weiterentwicklung meiner Masterarbeit

Ablauf:

| | |
|---|---|
| *15-18* | *Pflanzentausch & Hofbepflanzung* |
| 18:30 | Begrüßung & Vorstellungsrunde |
| 18:45 | Kurze Einführung in das Thema |
| 19:00 | Gemeinsames Brainstormen mit den Patterns<br>- 15 Min. Bewertung der Patterns<br>- 15 Min. Ideensammlung & Ergänzung von Patterns |
| 19:30 | *Pause* |
| 19:45 | Analyse und Ziele für das Gebiet<br>- Analyse der existierenden Probleme und Potenziale<br>- Verortung möglicher Patterns auf der Karte |
| 20:15 | Zusammenfassung der Ergebnisse & Ausblick |
| 20:50 | Feedback |
| 21:00 | Abschluss |

Für Verpflegung ist gesorgt!

* Roe, J., & McCay, L. (2021). Restorative Cities. Urban Design for Mental Health and Wellbeing. Bloomsbury Visual Arts.




*// Erholung, Wohlbefinden, Klimaanpassung, Stadtnatur, Begegnung*

**Pattern Language**
*… eine Sammlung von Entwurfsideen, basierend auf Theorie und Praxis, die je nach Nachbarschaft kombiniert und angewandt werden können.*

**Erholungsräume**
(engl. Restorative Environments)
*… Orte, die zur Regulierung unserer Emotionen und Erholung von geistiger Erschöpfung, Stress und den Anforderungen des täglichen Lebens beitragen (Roe & McCay, 2021).**

**Über mich:**
*Clarissa Bechmann*
*B.Sc. Stadt- und Regionalplanung (BTU Cottbus)*
*Voraussichtlich 07/2023:*
*M.Sc. Urbanism (TU Delft)*

[Fig. 156] Workshop announcement

**Workshop:**
**Stadtnatur im Alltag für Erholung im Kiez**

Teil 1:
**Gemeinsames Brainstormen mit den Patterns (Gruppen mit 3-4 Personen)**

Zuerst jeweils individuell, dann gegenseitiger Austausch

a) 15 Min. Bewertung der Patterns
Markieren Sie die Patternkarten mit den Stickern:
- **Grün**: Zustimmung = Pattern passt für das Gebiet und ist umsetzbar
- **Rot**: Widerspruch = Pattern ist unpassend und nicht realisierbar
- **Gelb**: Vielleicht = Offen für Diskussion
und legen Sie Ihre 2-4 Favoriten fest.

b) 15 Min. Ideensammlung & Ergänzung von Patterns
Fehlt etwas? Nutzen Sie die Klebezettel für Ergänzungen zu den Patterns.
Entwickeln Sie Ihre eigenen Patterns! Überlegen Sie sich einen Namen und beschreiben Sie kurz das Ziel des Patterns. Können Sie eine kleine Zeichnung ergänzen?

Teil 2:
**Analyse und Ziele für das Gebiet (in den bestehenden Gruppen)**

30 Min.

a) Setzen Sie reihum die Fähnchen und Spielsteine, um bestehende Probleme, Potenziale und anwendbare Patterns auf der Karte zu verorten.
Schreiben Sie dafür individuell ein Schlagwort auf das jeweilige Fähnchen, beginnend mit den Problemen setzt jede*r nacheinander ein Fähnchen und begründet die Entscheidung. Das kann für mehrere Runden wiederholt werden.

b) Unsere Ziele für den Kiez! Schreiben Sie ein kurzes Statement:
Was wünschen wir uns für den Kiez in Hinblick auf Stadtnatur und Erholungsräume? Wo und auf welche Art könnte das Gebiet aufgewertet werden? Welche Orte laden zur Erholung ein und könnten noch verbessert werden? Denken Sie auch über die Grenzen des Gebiets hinaus!

c) Geben Sie Ihrer Idee einen Namen.

Probleme

Potenziale

Patterns

Teil 3:
**Abschluss (Plenum)**

a) 15 Min. Zusammenfassung der Ergebnisse:
Welche Ziele haben Sie entwickelt? Wo gibt es Gemeinsamkeiten und Unterschiede? Ergänzen oder widersprechen sich die Unterschiede? Wie lassen sich die Ideen zu einer gemeinsamen Vision für Moabit West kombinieren?
b) 20 Min. Meine Ideen für den Kiez: Vorstellung und gemeinsame Auswertung

c) 10 Min. Feedback

Bitte füllen Sie den Fragebogen zum Abschluss aus!

[Fig. 157] Workshop structure



FEEDBACK QUESTIONS (Original in German)

1.) War der Workshop hilfreich?
o ja
o nein
o teilweise

2.) Was sind die drei wichtigsten Erkenntnisse für Sie nach dem Workshop? Haben Sie etwas Neues heute gelernt?

3.) Weil...
o Wir haben ein besseres Verständnis für die Probleme und Potentiale im Kiez erlangt
o Wir haben gute Ideen für den Kiez gesammelt
o Wir haben mehr über die Bedeutung von Grünräumen für die Erholung gelernt
o Wir haben viele Ideen ausgetauscht und von unserem verschiedenen Wissen profitiert
o Wir haben uns besser kennen gelernt, was das soziale Netzwerk verbessert hat
o Wir haben Inspirationen für Projekte gesammelt, die wir selber umsetzen können
o Sonstiges: _____

4.) Waren die Patterns verständlich und einfach zu nutzen?

| | o | o | o | o | o | |
|---|---|---|---|---|---|---|
| Schwer verständlich | 1 | 2 | 3 | 4 | 5 | Auf den ersten Blick begreifbar |

5.) Haben Sie Tipps, wie die Pattern Language einfacher nutzbar gemacht werden könnte?

6.) Welche Patterns waren Ihre Favoriten und warum?

7.) Würden Sie die Pattern Language in Zukunft weiternutzen?
o ja
o nein
Weil: _____

8.) Weitere Kommentare, Tipps, Anmerkungen oder Lob, das Sie teilen möchten?

EVALUATION FEEDBACK ANSWERS (original)

1.) War der Workshop hilfreich?


2.) Was sind die drei wichtigsten Erkenntnisse für Sie nach dem Workshop? Haben Sie etwas Neues heute gelernt?

*- Austausch mit anderen interessierten. Erkenntnis ähnliche Wünsche*
*- Welche Orte in Kiez mehr Hilfe brauchen, mit Ideen und Meinungen von anderen. Neue umsetzbare Optionen für unseren Kiez. Wie wichtig ist es, sowohl für die Natur als auch für die Nachbarschaft zu planen.*
*- Ich habe den Kiez nochmal aus einer neuen Perspektive kennengelernt. Es ist sehr hilfreich, sich intensiv mit den Gegebenheiten vor Ort auseinanderzusetzen, um die möglichen Bedarfe aber auch Stellschrauben zu erkennen, um eine Veränderung voranzutreiben.*

3.) Weil...

*3 x* o Wir haben ein besseres Verständnis für die Probleme und Potentiale im Kiez erlangt
*3 x* o Wir haben gute Ideen für den Kiez gesammelt
*2 x* o Wir haben mehr über die Bedeutung von Grünräumen für die Erholung gelernt
*3 x* o Wir haben viele Ideen ausgetauscht und von unserem verschiedenen Wissen profitiert
*2 x* o Wir haben uns besser kennen gelernt, was das soziale Netzwerk verbessert hat
*1 x* o Wir haben Inspirationen für Projekte gesammelt, die wir selber umsetzen können
*0 x* o Sonstiges: ____//_____

4.) Waren die Patterns verständlich und einfach zu nutzen?

| | o | o | o | o | o | |
|---|---|---|---|---|---|---|
| Schwer verständlich | 1 | 2 | 3 | 4 | 5 | Auf den ersten Blick begreifbar |
| | | | | *1 x* | *2 x* | |

5.) Haben Sie Tipps, wie die Pattern Language einfacher nutzbar gemacht werden könnte?

*- Nein, ich fand sie einfach zu benutzen*
*- Die Aufgabenstellung oder das Ziel zur Bewertung/ Markierung der Patterns könnte noch etwas klarer Foruliert sein. Ich denke, das würde die Nutzbarkeit erleichtern, ABER auch die individuelle Freiheit in der Bewertung etwas einschränken. Ich fand es also so wie es war sehr gut!*

6.) Welche Patterns waren Ihre Favoriten und warum?

*- Ich hatte viele Favoriten. Es gab viele Möglichkeiten, von klein bis groß, die in der Nachbarschaft genutzt werden konnten.*
*- Leider kann ich gerade nicht mehr auf die Patterns zugreifen. Es waren aber die Patterns, welche den sozialen Zusammenhalt durch Naturerfahrungen beschrieben haben. In der Natur gutes für dich selbst, die Umwelt und das Gemeinschaftsgefühl tun.*

7.) Würden Sie die Pattern Language in Zukunft weiternutzen?


Weil:

*- Tolle Anregungen.*
*- Sie zeigen Optionen und Kategorien, die für die Entwicklung des Kiez nützlich sind*
*- ...sehr schön veranschaulicht, macht komplexe Themen greifbar.*

8.) Weitere Kommentare, Tipps, Anmerkungen oder Lob, das Sie teilen möchten?

*- Ich finde, die Karten sind eine tolle Idee! Die Gruppen müssen nicht mit Ideen bei Null anfangen. Sie geben uns Optionen, die gut zu entwickeln sind, und wir können die auswählen, die für jeden Bereich am besten sind*
*- Wie schon persönlich gesagt hat mir der Workshop sehr viel Spaß gemacht, mich motiviert, das Thema wieder präsenter in den Kopf gerückt und ich konnte durch den Austausch neue Erkentnisse über den Kiez gewinnen. Deine Materialien sind super schön aufbereitet, man merkt, du hast sehr viel Mühe und Zeit investiert. Vielen Dank :)*

# APPENDIX 2: WORKSHOP (in English)

**Workshop:**
**Daily urban nature for restoration close-by**



! 19.04.2023
• Stadtschloss Moabit, Rostocker Str. 32B

Occasion:
Participative co-creation workshop as part of my master's thesis in the field of Urbanism

What is it about?
Developing and qualifying urban green spaces to provide restorative spaces that enhance personal and ecological well-being

Why here?
Hutten- and Beusselkiez are strongly affected by environmental stressors, high population density, and confined living conditions with a lack of public green space for restoration

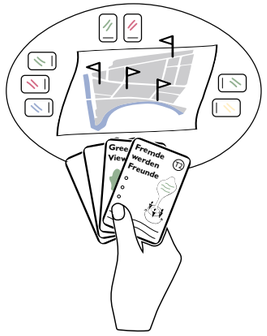
→ active neighbourhood and existing projects offer the potential for further development of the area while focusing on personal and ecological well-being

Goals of the workshop:
- Collaborative development of scenarios for possible restorative environments using the Pattern Language "Restoration with Urban Nature"
- Exchange of knowledge and experience
- Input for the further development of my master's thesis

Timetable:

| | |
|---|---|
| *15-18* | *Plant exchange & planting in the yard* |
| 18:30 | Welcome & Get to know each other |
| 18:45 | Short introduction to the topic |
| 19:00 | Brainstorming with the patterns |
| | - 15 Min. Evaluation of the patterns |
| | - 15 Min. Collection of ideas and completion |
| 19:30 | *Break* |
| 19:45 | Analysis and design of the area |
| | - Analysis of existing problems and potentials |
| | - Localisation of suitable patterns on the map |
| 20:15 | Summary of the results & outlook |
| 20:50 | Feedback |
| 21:00 | Conclusion |

Snacks are provided!




*// Restoration, Well-Being, Climate Adaptation, Urban Nature, Encounter*

**Pattern Language**
*… a collection of design ideas, based on theory and praxis, that can be combined and applied to different neighbourhoods.*

**Erholungsräume**
(engl. Restorative Environments)
*… Places that contribute to the regulation of our emotions, recovery of mental fatigue, stress and the demands of everyday life (Roe & McCay, 2021).**

**About me:**
*Clarissa Bechmann*
*B.Sc. Urban and Regional Planning (BTU Cottbus)*
*Expected 07/2023:*
*M.Sc. Urbanism (TU Delft)*

* *Roe, J., & McCay, L. (2021). Restorative Cities. Urban Design for Mental Health and Wellbeing. Bloomsbury Visual Arts.*

[Fig. 158] Workshop announcement translated



**Workshop:**
**Daily urban nature for restoration close-by**

Part1:
**Collective brainstorming with the patterns (groups of 3-4 people)**

Per task: first individually, then discussion

a) 15 Min. Evaluation of the patterns
Highlight the pattern cards with the stickers:
- **Green:** Agree = Pattern is suitable for the area and viable
- **Red:** Disagree = Pattern does not fit and is not feasible
- **Yellow:** Maybe = Open for discussion
and choose your 2-4 favourites.

b) 15 Min. Collection of ideas and completion Is something missing? Use the sticky notes to add comments to the patterns.
Make your own pattern! Think of a name and briefly describe the aim of the pattern. Can you add a little drawing?

Part 2:
**Analysis and goals for the area (in the existing groups)**

30 Min.

a) Take turns to place flags and tokens to locate existing problems, potentials, and applicable patterns on the map.
Write a keyword individually on the respective flag, starting with the problems, each person places a flag one after the other and justifies the decision. This can be repeated for several rounds.

Problem
Potential
Pattern

b) Our goals for the area! Write a short statement: What do we wish for the neighbourhood in terms of urban nature and restorative environments? Where and how could the area be improved? Which places invite for restoration and could be enhanced? Think beyond the boundaries of the neighbourhood too!

c) Give your vision a name.

Part 3:
**Conclusion (plenary)**

a) 15 Min. Summary of the results: which goals did you develop? Where do you see differences and similarities? Do the differences complement or contradict each other? Can the ideas be combined to a collective vision for Moabit West?
b) 20 Min. My ideas for the neighbourhood: presentation and discussion about them together

c) 10 Min. Feedback

Please fill out the survey at the end!

[Fig. 159] Workshop structure translated

## FEEDBACK QUESTIONS (translated)

1.) Was the workshop valuable?

o yes
o no
o partly

2.) What are the three most important findings for you after the workshop? Did you learn something new today?

3.) Because...

o We got a better understanding for the potentials and deficits in the neighbourhood
o We collected good ideas for the area
o We learned more about the importance of green spaces for restoration
o We exchanged many ideas and benefited from our different knowledge
o We got to know each other better, which improved the social network
o We gained inspiration for projects that we can realise by ourselves
o Others: _____

4.) Were the patterns understandable and easy to use?

| | o | o | o | o | o | |
|---|---|---|---|---|---|---|
| Hardly understandable | 1 | 2 | 3 | 4 | 5 | Understandable on the first view |

5.) Do you have suggestions to make the patterns easier to use?

6.) Which patterns were your favourites and why?

7.) Would you continue to use the pattern language in the future?

o yes
o no

Because: _____

8.) Any other comments, hints, annotations or compliments you would like to share?



## EVALUATION FEEDBACK ANSWERS (translated)

Participants (n=3)

1.) Was the workshop valuable?


2.) What are the three most important findings for you after the workshop? Did you learn something new today?

*- Exchange with other interested people. Discovering similar desires.*
*- Identifying which areas in the neighborhood require more help, with ideas and opinions from others. Finding new feasible options for our neighborhood. Planning for both nature and community is important.*
*- I got to know the neighborhood again from a new perspective. It is very helpful to engage deeply with the local conditions in order to recognize possible needs and levers for driving change forward.*

3.) Because...

*3 x* o We got a better understanding for the potentials and deficits in the neighbourhood
*3 x* o We collected good ideas for the area
*2 x* o We learned more about the importance of green spaces for restoration
*3 x* o We exchanged many ideas and benefited from our different knowledge
*2 x* o We got to know each other better, which improved the social network
*1 x* o We gained inspiration for projects that we can realise by ourselves
*0 x* o Others: _____

4.) Were the patterns understandable and easy to use?

| | o | o | o | o | o | |
|---|---|---|---|---|---|---|
| Hardly understandable | 1 | 2 | 3 | 4 | 5 | Understandable on the first view |
| | | | | *1 x* | *2 x* | |

5.) Do you have suggestions to make the patterns easier to use?

*- No, I found it easy to use.*
*- The task or goal for evaluating/marking the patterns could be formulated a bit clearer. I think that would*

*make it easier to use, BUT it would also limit individual freedom in the evaluation. So, I thought it was very good as it was!*

6.) Which patterns were your favourites and why?

*- I had many favorites. There were many opportunities, from small to large, that could be utilized in the neighborhood.*
*- Unfortunately, I can't access the patterns right now. But they were the ones that described promoting social cohesion through nature experiences. Doing good for yourself, the environment, and the sense of community in nature.*

7.) Would you continue to use the pattern language in the future?


*yes*

Because:

*- Great suggestions.*
*- They present options and categories that are useful for the development of the neighborhood.*
*- ... very nicely illustrated, making complex topics tangible.*

8.) Any other comments, hints, annotations or compliments you would like to share?-

*- I think the cards are a great idea! The groups don't have to start with ideas from scratch. They provide us with options that are good to develop, and we can select the ones that are best for each area.*
*- As I already mentioned personally, I really enjoyed the workshop, it motivated me and brought the topic back to my mind, and through the exchange, I gained new insights about the neighborhood. Your materials are beautifully prepared, and it's evident that you invested a lot of effort and time. Thank you very much :)*



# APPENDIX 3: FIELDWORK

Semi-open street conversations

Short introduction about myself and the graduation project, intention to find out how the people in the neighbourhood are feeling

**Original questions in German:**

1. Wohnen Sie hier in der Gegend?
2. Haben Sie einen liebsten Ort im Kiez, wenn Sie rausgehen und Energie auftanken wollen?
   >> Was schätzen Sie besonders an dem Ort?
3. Auf einer Skala von 1-10, wobei 10 für sehr grün steht: Wie grün empfinden Sie die Gegend?
4. Spielt Natur eine Rolle in ihrem Alltag? Inwiefern?
5. Wo gehen Sie hin, wenn Sie Natur erleben wollen?
   - Hier im Kiez
   - Im Bezirk
   - In der gesamten Stadt/Umland
6. Auf einer Skala von 1-10, wobei 10 für sehr eng verbunden steht: wie verbunden fühlen Sie sich mit dem Kiez und Ihren Nachbarn?
7. Was verbindet Sie mit der Nachbarschaft?

**Translation to English:**

1. Do you live here in the area?
2. Do you have a favourite place in the neighbourhood when you want to go out and recharge your energies?
   >> What do you value especially at that place?
3. On a scale of 1-10, with 10 being very green, how green do you perceive the area to be?
4. Does nature play a role in your daily life? In what way?
5. Where do you go to experience nature?
   - Here in the neighbourhood
   - In the district
   - In whole city/ surroundings
6. On a scale of 1-10, with 10 being very closely connected, how connected do you feel to the neighborhood and your neighbors?
7. Was connects you to the neighbourhood?