Graduation Plan

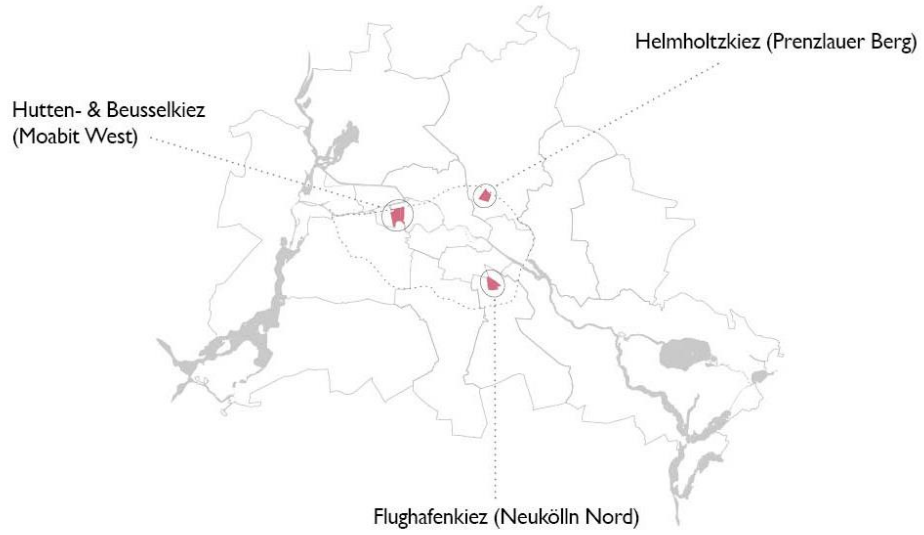
Master of Science Architecture, Urbanism & Building Sciences

Graduation Plan: All tracks

Personal information	
Name	Clarissa Bechmann
Student number	5634520

Studio		
Name / Theme	Metropolitan Ecologies of Place / Urban Ecology and Biophilic Design	
Main mentor	Dr. Ir. R.M. (Remon) Rooij	Spatial Planning and Strategy
Second mentor	Dr. Ir. N.M.J.D. (Nico) Tillie	Landscape Architecture
Argumentation of choice of the studio	I chose the MEP studio because I am interested in the intersection of Urbanism and Landscape Architecture which will be reflected in my graduation project by the development of a design and implementation strategy that includes a focus on Urban Ecology and Biophilic Design. Considering the ongoing challenges that urbanisation and climate change bring, a shift in the current planning practices is needed to highlight the importance of urban nature for the quality of urban life. Since not only the well-being of humans but also the ecological well-being is suffering from the urban conditions, an integrated social-ecological approach is necessary to improve the state of the whole system. As the studio aims for integrative, systemic thinking, my project fits very well with its cross-disciplinary approach. Thus, it revolves around the relationship of people, the built environment, and Urban Ecology. Consequently, when aiming for the qualification of restorative urban green spaces regarding well-being and Ecosystem Services, topics like biodiversity increase and climate adaptation are considered likewise. The studio also emphasises the exploration of the relationship between Design, Space, and Life as well as the direct interaction with locals. These are directions that my project takes by focusing on designing for better living conditions under the consideration of the voices of residents through interviews and a workshop.	

Graduation project	
Title of the graduation project	Urban Nature in Daily Doses - Restorative design strategies for improved personal and ecological well-being in Berlin

Goal	
Location:	**Metropolitan area of Berlin, Germany**  Fig. 1: Focus areas (by author) Three focus areas were chosen to test and apply the design and strategy. The areas (Helmholtzkiez, Prenzlauer Berg; Beussel- and Huttenkiez, Moabit West; Flughafenkiez, Neukölln Nord) 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 posed problem,	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 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. Thus, 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).

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.

Fig. 2: Population density, 2021 (by author, based on Amt für Statistik Berlin-Brandenburg, 2021)

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, 2019).

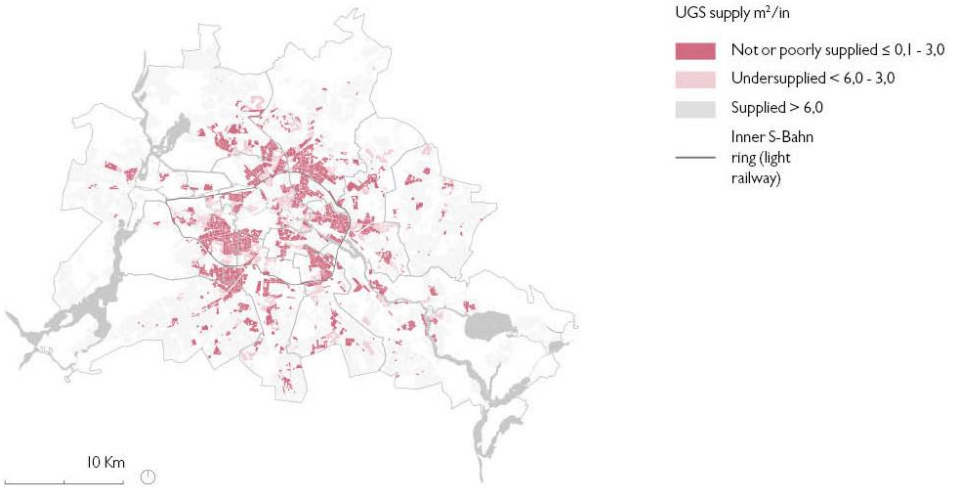


Fig. 3: Lack of urban green spaces in proximity, 2020 (by author, based on Amt für Statistik Berlin-Brandenburg, 2020)

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).

Summary 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.

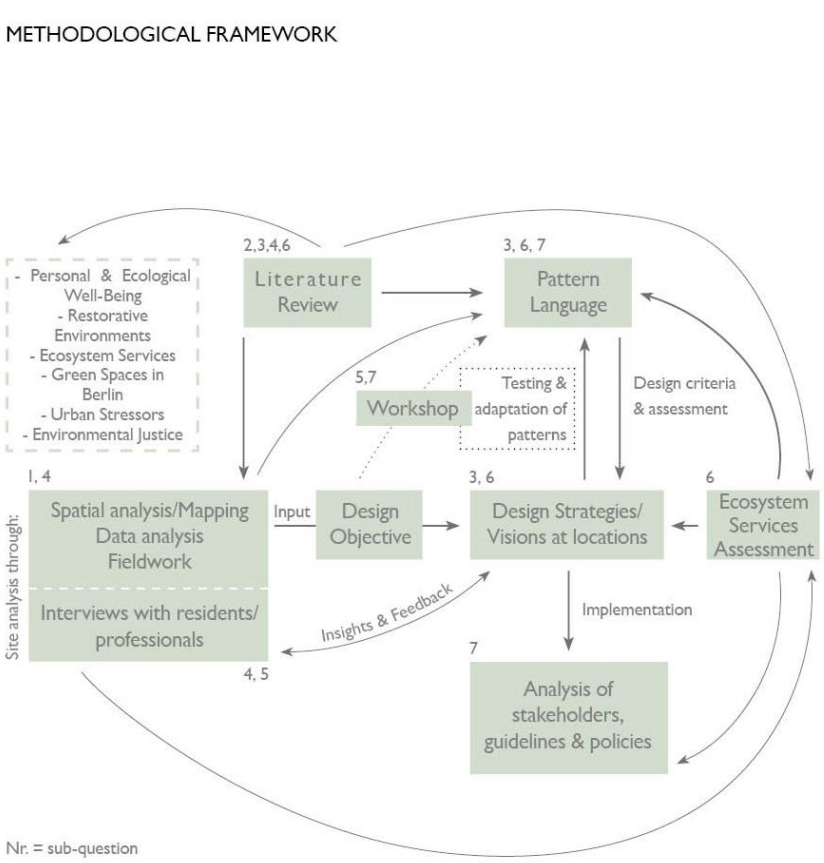
Still, there is lacking awareness of that issue which is reflected in planning decisions and individual behaviour.

research questions and

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?

	Supporting sub-questions: 1. What is the status quo of urban green spaces in Berlin regarding their quality, quantity, and accessibility? 2. Which factors in the urban environment influence personal well-being? 3. What are the characteristics of restorative environments and how can they be translated into design solutions? 4. What is the current state of personal well-being of the people in the metropolitan region of Berlin and in the focus areas? 5. How do the residents in the chosen neighbourhoods experience the relationship between their personal well-being and urban nature? 6. What are ecosystem services and how can they be improved in terms of human well-being as well as biodiversity, and climate adaptability? 7. 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?
design assignment in which these result.	The design assignment consists of design strategies for restorative environments with a focus on urban green spaces and the provided ecosystem services that contribute to personal and ecological well-being. Next to the improvement of the quality of urban life, the design aims for better climate adaptation and increased biodiversity by finding ways to include urban nature in the built environment on different scales. The development of a pattern language is here the guiding instrument to bridge theory and design. The patterns are based on the parameters "restorative potential", "ecosystem services", "contribution to personal well-being", and "contribution to ecological well-being". Consequently, the patterns help to create design strategies that will be applied to the study area of Berlin with a focus on the chosen neighbourhoods. The operationalisation of the key concepts of the project 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 implementation of the design strategies and theoretical knowledge into practice.
Process	
Method description	



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

Fig. 4: Methodological framework (by author)

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 very important aspect, that plays a role in the assessment of the pattern language, design strategies, visions, and implementation strategy, is ecosystem services. Based on a choice of ecosystem services, the project is evaluated regarding its contribution to ecological and personal well-being.

Literature and general practical preference

A selection of relevant literature on the main concepts

Restorative environments:

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.

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.

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

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

Urban Nature:

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

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

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

Urban Ecology and Biophilic Design:

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

Kowarik, I., & Fischer, L. K. (2018). *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.

Personal well-being and Urban Stressors:

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

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

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

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

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

Ecosystem Services:

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

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

Environmental Justice:

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

Senatsverwaltung für Umwelt, Verkehr und Klimaschutz (SenUVK, 2019). *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

Guidelines and policies for Berlin

Hansen, R., Born, D., Lindschulte, K., Rolf, W., Bartz, R., Schröder, A., Becker, C. W., Kowarik, I., & Pauleit, S. (2018). *Grüne Infrastruktur im urbanen Raum: Grundlagen, Planung und Umsetzung in der integrierten Stadtentwicklung*. Bundesamt für Naturschutz.

Senatsverwaltung für Umwelt, Mobilität, Verbraucher- und Klimaschutz (SenUMVK, n.d.). *Rechtsvorschriften im Bereich Stadtgrün*. Berlin.de. https://www.berlin.de/sen/uvk/service/rechtsvorschriften/natur-und-gruen/stadtgruen/

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

Useful Pattern Languages

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

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

Francissen, S. (2022). *Dissolving Distinction*. [Master's thesis, Delft University of Technology].

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

General practical experience:

- Interviews with professionals within the focus areas (district management, neighbourhood centre, mobile social worker)
- Fieldwork (including observations, street interviews)
- Workshop with the pattern language for co-creation and evaluation

- Reference projects in Berlin: e.g. “Strategie Stadtlandschaft Berlin” (SenUMVK, 2015), “Kool im Kiez” (AG Urban, 2022, catalogue of measures for climate adaptation with implementation strategy), “Healthy-cities-network”

Reflection

1.) What is the relation between your graduation (project) topic, the studio topic (if applicable), your master track (A,U,BT,LA,MBE), and your master programme (MSc AUBS)?

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 master track within the master programme “Architecture, Urbanism and Building Sciences” 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 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 of 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. In the context of the master programme, the topic contains relations to some of the other tracks as well. Given the multidimensionality of the project, the design has a strong focus on landscape architecture but links also to architecture when considering design strategies that directly involve urban nature with buildings.

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

The awareness for personal and ecological well-being is rising in recent years but still an underrepresented 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 liveability of humans and non-human organisms in the city.
Considering the United Nations Sustainable Development Goals, the assurance of healthy lives 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.
Especially, in view of environmental justice it is enormously important to enable healthy living conditions for all societal groups (SenUVK, 2019). By developing urban green spaces that enable stress reduction and improve well-being, the quality of life increases and opportunities for healthier societies arise. Moreover, raising awareness for 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.
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. 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). Since a variety of factors in the built environment influence personal and ecological well-being, it is a necessity for urbanists to design accordingly for improving the conditions for humans and the natural environment. It is essential here to realise the multidisciplinary dimension of well-being in the urban context to understand correlations and apply expertise from different fields to urban planning and design practice.

So far, 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 will apply existing research to the specific case study location of Berlin and the findings can also be transferred 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 will lead to more specific guidelines for restorative environments from point of view of Urban Ecology.
Furthermore, by translating research and experience into the development of a pattern language, patterns can be applied to Berlin but also transferred to other settings and consequently be useful for other professionals and locals. Additionally, the project can contribute to the interdisciplinary collaboration and exchange of knowledge in the field of Neurourbanism which started to evolve under the "Forum Neurourbanism" in Berlin (Adli et al., 2017).

Further references (since not mentioned in the literature)

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