RESTORATION WITH URBAN NATURE

PATTERN ATLAS

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Restoration with Urban Nature
Pattern Atlas

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ABOUT THE ATLAS

The pattern atlas “Restoration with Urban Nature” is part of the master’s graduation project: “Urban Nature in Daily Doses - Restorative design strategies for improved personal and ecological well-being in Berlin.”

July 2023, Delft

"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)

WHAT IS RESTORATION WITH URBAN NATURE?

Restoration with Urban Nature is a Pattern Language dedicated to the creation of restorative environments in the urban context to improve personal and ecological well-being. Hereby, restorative environments are understood as places that contribute to the regulation of our emotions, recovery of mental fatigue, stress, and the demands of everyday life (Roe & McCay, 2021). Since cities negatively affect our well-being due to numerous amount of stressors, it is important to draw attention to possible ways of designing and planning the urban environment to provide restoration from the urban stressors. Natural environments have been shown to hold highly restorative potentials whilst providing various ecosystem services and contributing to the urban climate. Urban Nature consists of all natural elements in the urban context on various scales, reaching from parks, forests, cemeteries, allotment gardens, and water features to balconies, green rooftops, and planters. It includes designed and maintained green spaces as well as spontaneous emerging wilderness with all living organisms.

Therefore, Restoration with Urban Nature explores various ways of implementing and qualifying restorative settings in the built environment within different scales. Finally, the aim is to create awareness of the importance of well-being while planning and designing cities, focusing on the positive effects of urban nature.

WHO IS THAT ATLAS FOR?

The pattern atlas is intended to provide a helpful overview of design and planning possibilities for various stakeholders. It reaches out to everyone interested in improving their environment regarding restorative environments and daily urban nature experiences. Thus, the user groups reach from residents, various planners, and designers to project developers, land owners, and the municipality.

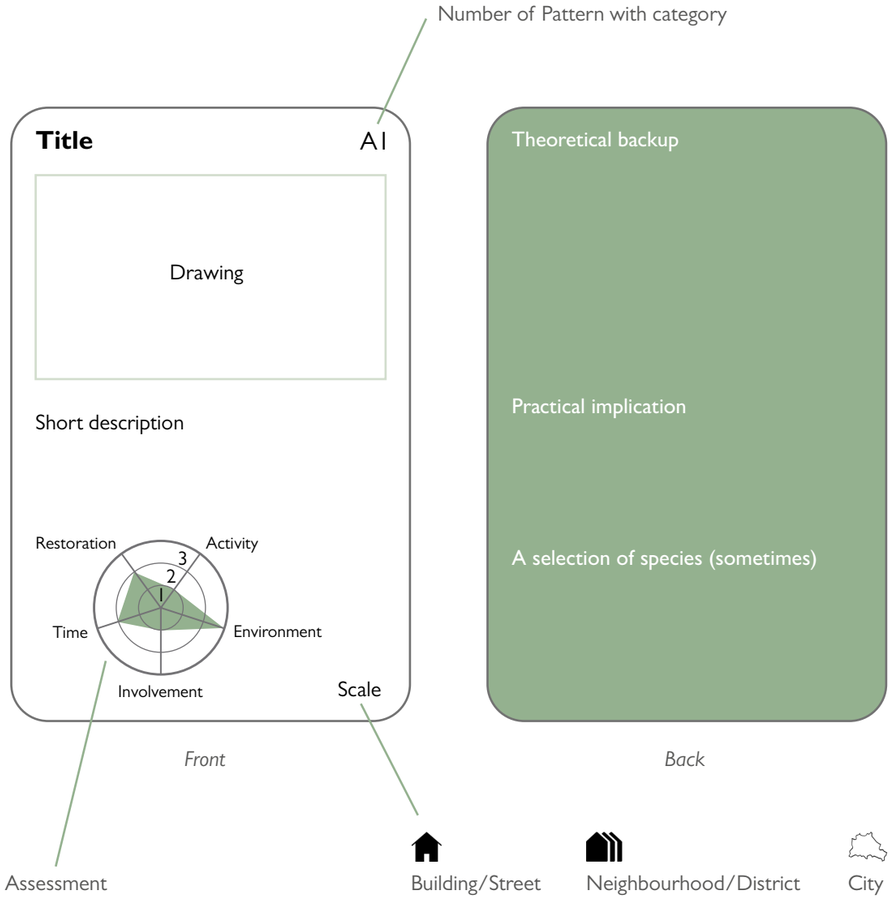
Restoration with Urban Nature is not only a design and planning tool but also guides the analysis of an area under specific viewpoints, offers knowledge gain by providing a theoretical background, and fosters communication and co-creation among different stakeholders.

USING THE ATLAS

The atlas contains a set of 29 patterns, organised by the six categories “General”, “Activity”, “Senses”, “Environment”, “Implementation, and “Bonus”.
Each pattern consists of a schematic visualisation that shows exemplary how the pattern might look like but it leaves room for adaptation to the specific context and should be understood as an option, not a rule. Also, some patterns are rather planning than design related and cannot be represented spatially.
A short description is supplemented by further theoretical information and ideas for the practical implementation. If applicable, a selection of suitable species is mentioned as well. There are more species available but the selection can be seen as inspiration. The Pattern Atlas Restoration with Urban Nature is used for and therefore explicitly refers to the case study location of Berlin. Thus, some practical hints and the choice of species is directly related to the place. Nevertheless, the patterns are still transferable to other contexts where the conditions are similar.
Additionally, each pattern is assessed based on its performance in terms of restoration, activity, environment, involvement of different stakeholders, and the temporal dimension. The assessment is described in the next section.

Relation of patterns:
A key characteristic of a pattern language is the network of related patterns that it forms. So, some patterns are more general and include other, more specific patterns. Related patterns can be applied together but also function individually. Moreover, the patterns can act at and across various spatial levels, which is indicated on the card as well.

HOW ARE THE CARDS ORGANISED?



HOW ARE THE PATTERNS ASSESSED?

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.

Why is an assessment helpful?
The user can see the strengths of the pattern on the first view. Also, it gives an understanding of the estimated time and the degree of state support that is needed for the realisation of an intervention.

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

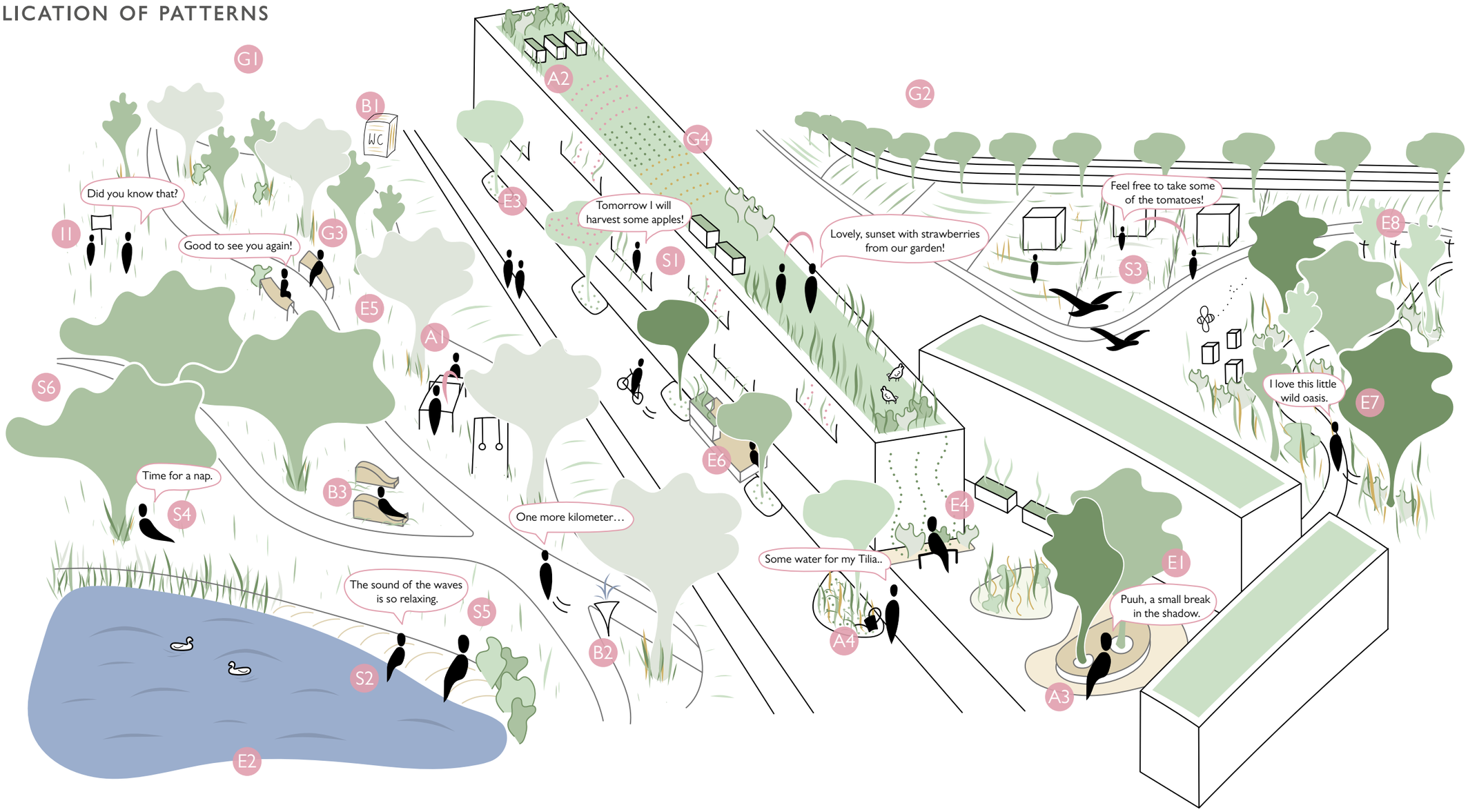
Involvement:
Private - public responsibility

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

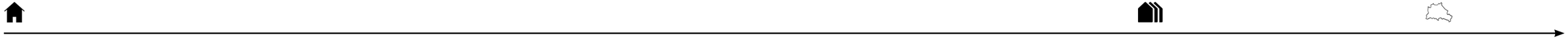
Time (in years)

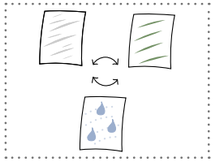
1. 0-1
2. 2- 5
3. 5-10

APPLICATION OF PATTERNS



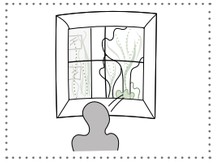
ORGANISATION BY SCALE AND TIME

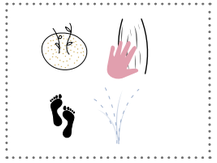


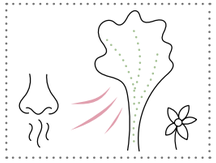

All in one (G4)

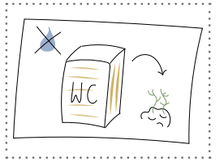

Sit with me (A3)


A tree friend (A4)

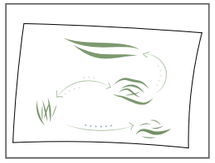

Green view (S1)


Touch it (S2)

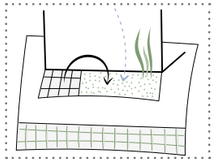

Smell it (S4)

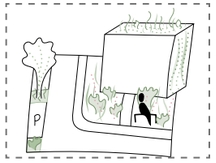


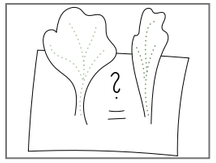
Free pee (B1)


Green corridor (G2)

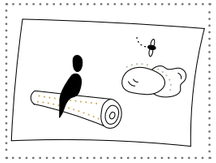

Sound of nature (S5)

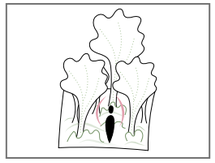

Open up! (E3)

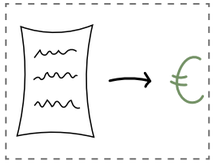

Leftovers (E4)

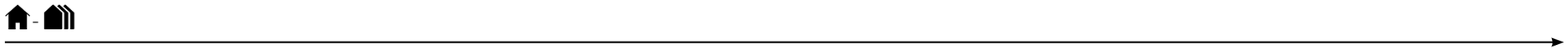

Tree = tree? (E5)


Free drink (B2)

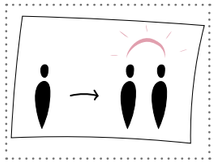

Materials matter (B3)


Lost in the woods (S6)

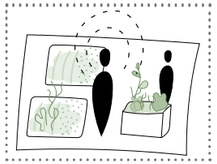

Funding (I4)

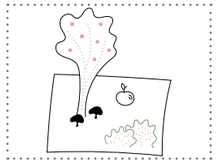


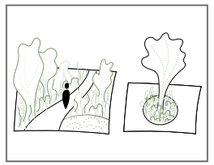
Nature around the corner (G1)


From strangers to friends (G3)

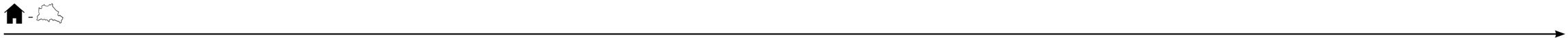

Fit with nature (A1)

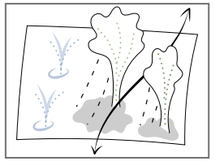

Plant with me (A2)

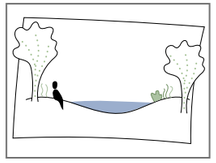

All you can eat (S3)

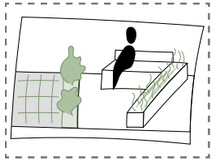

Into the wild (E7)

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




Cool down (E1)

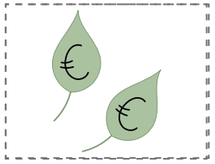

Water inside/out (E2)


Less cars, less stress (E6)

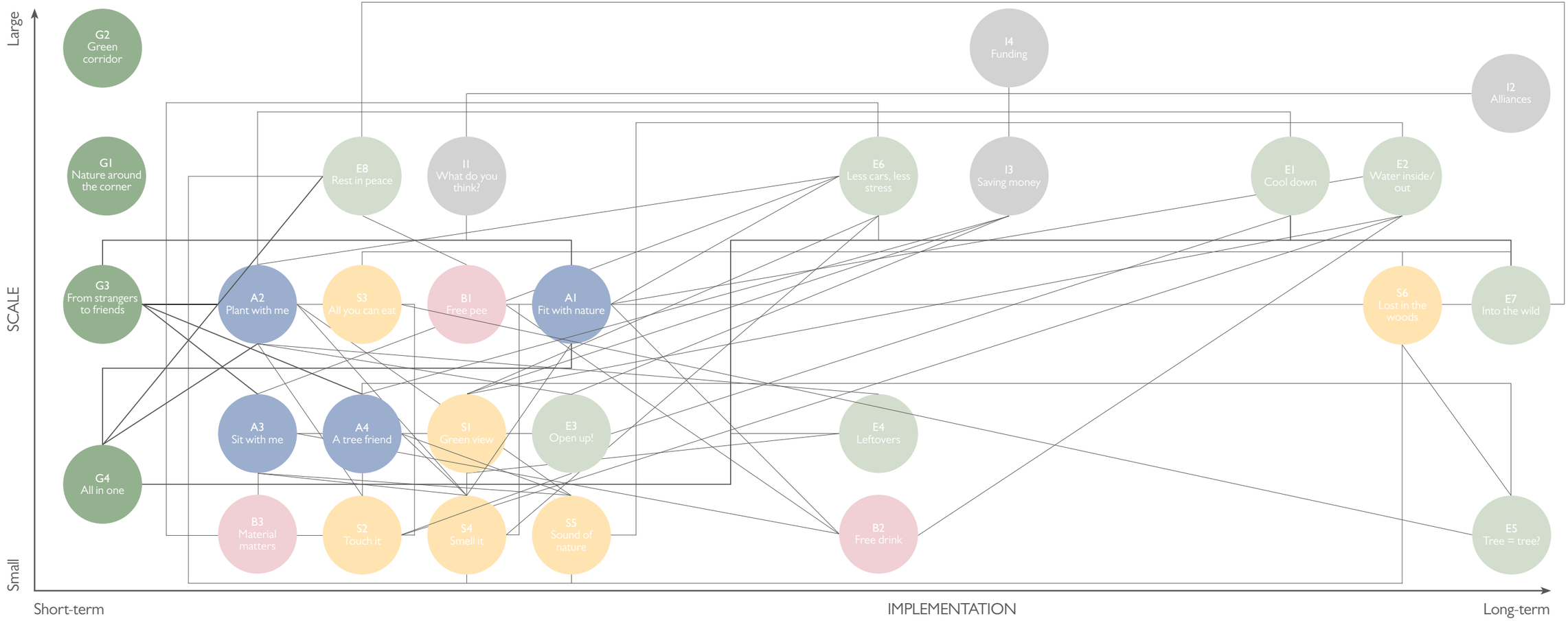

Rest in peace (E8)


What do you think? (I1)


Alliances (I2)


Saving money (I3)

PATTERNFIELD



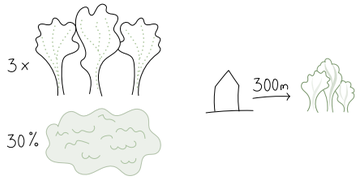
CONTENTS

Restoration with Urban Nature

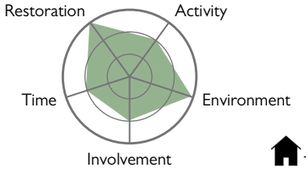
GENERAL

Nature around the corner

G1



Possibilities to experience nature in different ways close-to-home improve well-being and environmental justice.



Theoretical backup

A higher dose of weekly nature contact (at least two hours per week) leads already to positive health impacts (Roe & McCay, 2021). By making nature better accessible, a fair distribution of green for healthier living conditions for society can be ensured (SenUVK, 2019).

Practical implication

Providing nature contact on various scales, starting with the front yard and street greenery up to parks and urban forests.

3-30-300 rule:

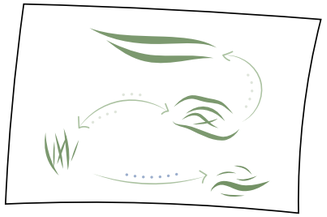
- 3 trees in the view from home
- 30% tree canopy per neighbourhood,
- max. 300 m to the nearest urban green space from every home (Konijnendijk, 2022)

Related to:

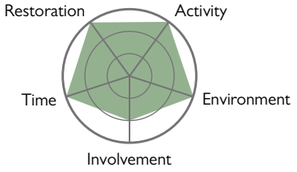
All patterns

Green corridor

G2



Networks of green structures create connections for wildlife and recreation, and contribute to climate adaptation.



Theoretical backup

Green networks that expand from local to regional scale provide better habitats for animals and are thus beneficial for biodiversity (NABU, 2022). The cooling effect for the urban climate improves and the air quality increases. Also, experiencing connected green spaces enhace the feeling of „being away“ and extent (Kaplan, 1995).

Practical implication

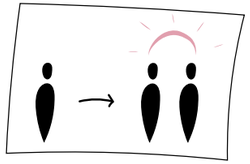
Connecting smaller green spaces with the bigger green infrastructure via trees, different sizes of parks, and green streets with car free zones and cycling connections. Also, open soil and waterways can act als connecting elements.

Related to:

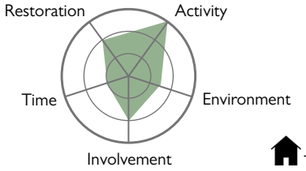
All patterns

From strangers to friends

G3



Public places for encounters increase social cohesion, which helps to reduce the feeling of loneliness and anonymity in the city.



Theoretical backup

Social stress in cities is a result of the combination of social density and social isolation (Adli & Schöndorf, 2020). However, creating and improving public spaces can foster social encounters and interaction, enhancing social cohesion and a sense of belonging. This leads to reduced social stress. Additionally, opportunities for occasional encounters with consequential strangers have a restorative effect (Blau & Fingerman, 2009).

Practical implication

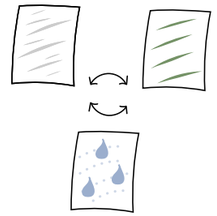
Creating attractive places to stay via natural elements, street furniture, and different activity zones. Enhancing interaction through sports possibilities and neighbourhood projects.

Related to:

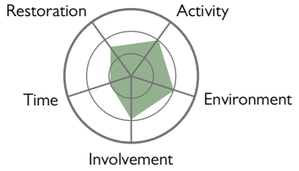
A1, A2, A3, A4, I1, I2

All in one

G4



Assigning multiple functions to a single area enables efficient use of limited space while accommodating diverse needs.



Theoretical backup

With growing pressure on the existing land, competition for land and conflicts of interest need to be handled. By applying multicoding - the multifunctional use of space - different needs can be combined while using existing space resources (Hansen et al., 2017; Böhm et al, 2017). Consequently, more areas are available for the creation of restorative environments.
The overlay of various uses such as recreation, conservation, and habitat is accompanied by the provision of various ecosystem services.

Practical implication

Streetscapes, parking spaces, rooftops, schoolyards, sports fields, water squares, vacant lots etc. hold the potential for multifunctional qualification.

Related to:

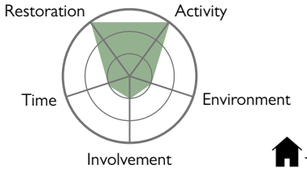
A1, A2, E1, E4, E6, E7, E8

ACTIVITY

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

Fit with nature A1

Various forms of exercising in nature improve health, well-being, and the social network.



Theoretical backup

An attractive environment with a higher amount of greenery increases walking activity (Roe & McCay, 2021). Also, working out in natural settings leads to better cardiovascular health, respiratory health, and mental well-being. Moreover, it brings opportunities for encounter with others.

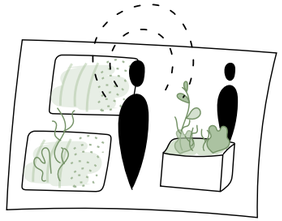
Practical implication

Stimulate walking and cycling by creating safe and connected routes for different movement speeds to and within UGS. Incorporate exercise elements, fields for urban sports, and table tennis tables in parks and squares for playful encounters.

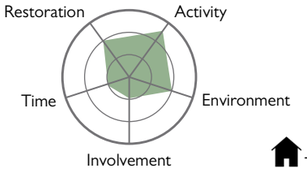
Related to:

G2, G3, G4, E2, E6, E7, S4, S5, S6, B1, B2

Plant with me A2



Gardening activities improve the human-nature relationship and foster social interaction.



Theoretical backup

Gardening positively influences well-being, mindfulness, a sense of community, and place attachment (Roe & McCay, 2021). The activity of planting offers a distraction from daily stressors and strengthens affiliation with nature.

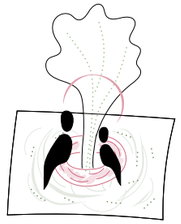
Practical implication

Possibilities for gardening can be in form of neighbourhood projects like community gardens, planting in front- and backyards, on rooftops as well as in patches around street trees or planters. Balconies and window sills are opportunities for creating a small garden even with a very limited amount of space.

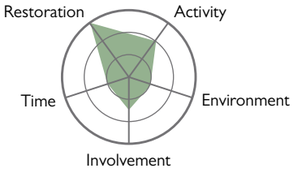
Related to:

G3, G4, A4, S1, S2, S3, S4, S5, E1, E3, E4, E6

Sit with me A3



The design and layout of public furniture invite for interaction with others and nature.



Theoretical backup

In public spaces, benches are often aligned or placed singularly, which is good for a quiet moment alone but not fostering an encounter with others. Moreover, sitting under a tree or within a natural setting has restorative effects.

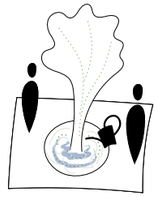
Practical implication

Benches facing each other, wooden platforms, and rounded shapes invite for communication. When placing benches aroud a tree, enough space for the tree to grow must be ensured.

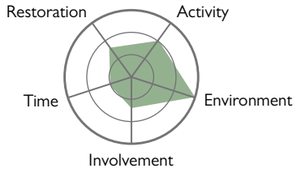
Related to:

G3, A4, S4, S5, E6, B1, B2, B3

A tree friend A4



Taking care of street trees and planting at tree patches improves the quality of a neighbourhood and connection to nature.



Theoretical backup

Street trees contribute to reducing stress and improving the urban climate, but they often suffer from drought in cities. Tree sponsorship benefits the health of the trees and strengthens the relationship with the environment (SenSU, 2014; see also AG.Urban, 2022). Additionally, taking responsibility promotes the connection to the neighborhood.

Practical implication

Planting new trees where space is available and adding pollinator-friendly plants to tree patches. Watering trees as part of tree sponsorships.

- "Stadtbaumkampagne"- street trees campaign Berlin
- "Gießdenkiez"- website for overview of watered trees

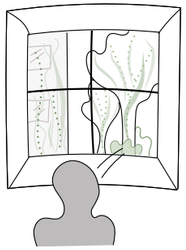
Related to:

G3, A2, A3, S1, S2, S4, S5, E5, B2, I3

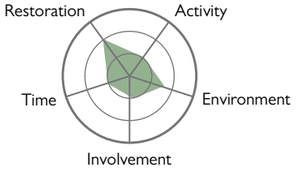
SENSES

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

Green view S1



A green view from the window increases restoration and productivity.



Theoretical backup

Window views of natural settings have a restorative effect by allowing the mind to wander and thus lowering levels of stress, anxiety, and tension (Kaplan et al., 1998). Also, satisfaction with the neighbourhood increases when seeing green (Kaplan, 2001). Seeing trees and other types of greenery from the workplace improves well-being, job satisfaction, and productivity (Kaplan, 1993; Gilchrist et al., 2015).

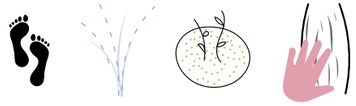
Practical implication

Street tree planting if enough space is available but also small-scale interventions like green patches, elevated planters, and plant pots in front of buildings. Vertical greenery, facade gardens, and balconies can contribute to the green view as well.

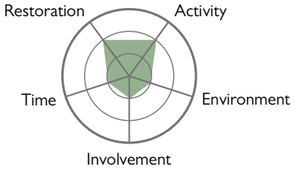
Related to:

A2, A4, S4, S5, E2, E3, E4, E6, I3

Touch it S2



Possibilities to engage with nature through physical touch are stimulating the mind.



Theoretical backup

Contact with soil improves the immune system and touch enhances engagement with a place (Roe & McCay, 2021). By interacting with nature, connections with and awareness of the natural environment increase.

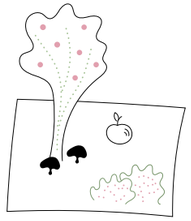
Practical implication

Creating barefootpaths and learning trails for haptic discovery for example about trees by touching the bark and defining the species. Water elements invite for playful interaction with a place and other people. Planting activities allow for direct contact with soil and plants.

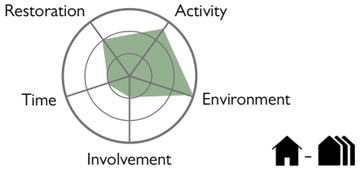
Related to:

A2, A4, S3, S6, E2, E3, B3

All you can eat S3



Harvesting edible plants in the city brings humans closer to nature while discovering a healthy diet.



Theoretical backup

Urban foraging in form of gathering wild plants and growing own food in cities fosters the human-nature relationship from an early age and creates awareness for biodiverse urban green spaces (Landor-Yamagata et al., 2018).

Practical implication

Creating an edible city by planting trees and shrubs that carry fruits. Growing herbs, vegetables, edible flowers, etc. as individual or part of community gardens.

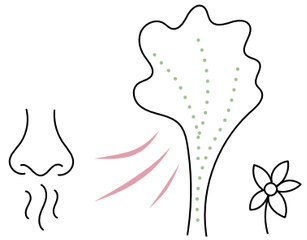
Species:

- Castanea sativa (Sweet chestnut)
- Cornus mas (Cornelian Cherry Dogwood)
- Malus domestica (Apple)
- Prunus (Cherry and plum)
- Sambucus nigra (Elder)
- Ribes (Current)

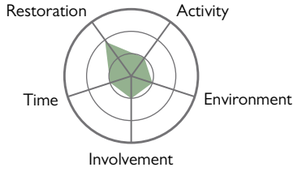
Related to:

A2, S2, S6, E5, E7

Smell it S4



Natural olfactory experiences contribute to a positive perception of a place.



Theoretical backup

Plants exude terpenes - active substances - that lead to stress relief, enhanced concentration, and improved mood (Cho et al., 2017).
Moreover, pleasant sensations evoke positive associations with a place and feelings of belonging (Roe & McCay, 2021).

Practical implication

Choosing plants that emit health-promoting odors and avoiding disturbing smells by keeping areas clean.

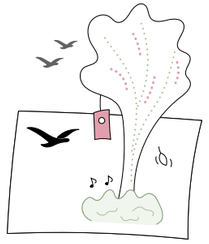
Species:

- Conifers
- Betula (Birch)
- Avoid female Gingko biloba

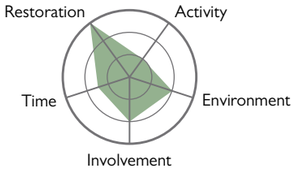
Related to:

A1, A2, A3, A4, S6, E2, E6, E8, B1

Sound of nature S5



Natural sounds decrease negative emotions and stress.



Theoretical backup

Hearing birds and other natural sounds has a stress-reducing effect by evoking positive emotions and associations with natural environments (Ratcliffe et al., 2018; Roe & McCay, 2021).

Practical implication

Creating attractive environments for birds by choosing bird-friendly species that offer food and places for nesting. Incorporating water elements into public spaces.

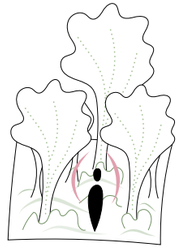
Species:

- Amelanchier lamarckii (Juneberry)
- Prunus maacki (Manchurian Cherry)
- Crataegus monogyna (Common Hawthorn)
- Malus sylvestris (Crab apple)
- Viburnum opulus (Guelder rose)
- Evergreen bushes, conifers, creepers

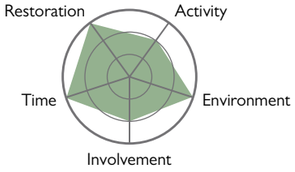
Related to:

A2, A3, A4, S6, E2, E8

Lost in the woods S6



Forest bathing evokes positive emotions and improves the immune system.



Theoretical backup

Shinrin yoku (= forest bathing in form of spending time in forests) has become popular in Japan due to its contribution to overall health (Roe & McCay, 2021). Moreover, urban forests provide manifold benefits for the urban climate by contributing to cooling, CO2 storage, oxygen production, and rainwater retention (Beatley, 2016).

Practical implication

Urban forest types vary by the degree of wilderness and anthropogenical influence. Next to bigger scale forest structures, urban tiny forests (Miyawaki method) are an opportunity for establishing highly biodiverse forests on small empty plots within the city. Due to cooperative planning and implementation, they foster environmental education (AG.Urban, 2022).

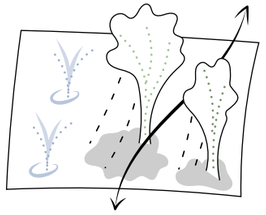
Related to:

A1, S2, S3, S5, S4, E5, E7, E8

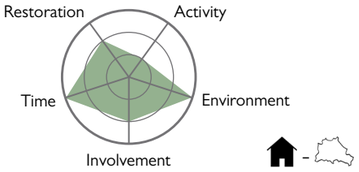
ENVIRONMENT

E1 - Cool down
E2 - Water inside/out
E3 - Open up!
E4 - Leftovers
E5 - Tree = tree?
E6 - Less cars, less stress
E7 - Into the wild
E8 - Rest in peace

Cool down E1



Water elements, trees, and other types of vegetation reduce heat in the city when applied correctly.



Theoretical backup

Shading, moisture, and unblocked air flows lower the temperature in cities. When planting temperature-regulating trees, it is important to consider that sufficient root space and moisture are needed (Roozen et al., 2022).

Practical implication

Planting trees not too densely and ensuring a variety of crown shapes and heights to avoid trapping the heat during the night.

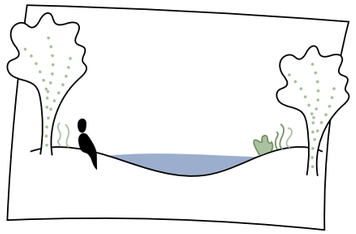
Species:

- Acer cappadocium (Cappadocian maple)
- Fagus sylvatica (Common beech)
- Tilia tomentosa (Silver lime)
- Platanus hispanica (London plane)

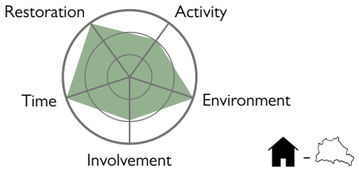
Related to:

G4, A2, A4, S1, E2, E3

Water inside/out E2



The sight of or interaction with water relieves stress.



Theoretical backup

Blue spaces invite physical activity and multisensory experiences that improve well-being (Roe & McCay, 2021). Therefore, well-maintained waterfronts are attractive and encourage activities such as walking, biking, and resting. In particular, naturally shaped edges are highly preferred (Kaplan et al., 1998).“

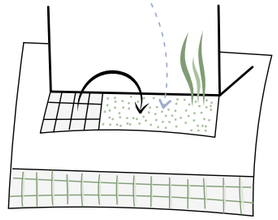
Practical implication

Creating paths and resting possibilities along waterfronts with opportunities to reach the water as well as keeping natural parts for protected shelter for animals. Designing water edges that allow a soft, animal-friendly transition from wet to dry. Incorporate water elements into public spaces for playful interaction whilst contributing to rainwater retention.

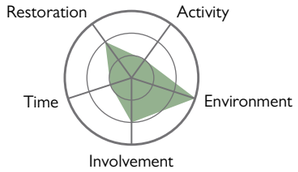
Related to:

A1, S1, S4, S5, E1, E3, B1, B2

Open up! E3



Unsealing of paved surfaces and the use of open pavement contributes to infiltration and cooling.



Theoretical backup

Open soil fosters rainwater retention and the provision of habitats for various species. It helps cool the surface temperature and open pavements reduce noise (de Roode, 2021; S.T.E.R.N., 2021). Especially in hot periods, open pavement is important to reduce heat-related health risks.

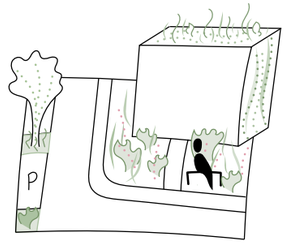
Practical implication

Unsealing leftover spaces along buildings, in courtyards, and spaces between parking plots. Consequently, the areas can be greened and transformed into restorative environments for the neighbourhood. Using (semi-)permeable pavement and as much open soil as possible when developing new areas.

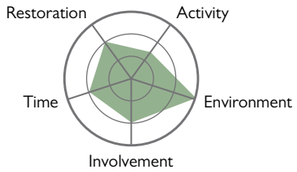
Related to:

S1, A2, E1, E2, E4, E6

Leftovers E4



Using „left-over“ spaces to implement greenery and infiltration areas.



Theoretical backup

Empty „left-over“ spaces on buildings and on the ground offer opportunities for planting and qualifying an area. Consequently, the vegetation has a cooling effect on the surrounding environment, and rainwater can infiltrate or be stored (S.T.E.R.N., 2021). Additionally, green roofs can provide both aesthetic and environmental benefits.

Practical implication

Planting greenery in empty spaces along buildings or parking lots, and greening facades and roofs.

Vertical greenery:
- Green facades, rooted in the ground or living walls using planters

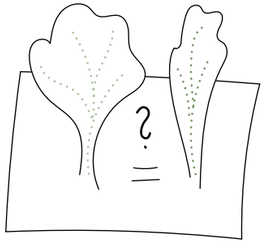
Green roofs:
- Intensive (accessible, stronger carrying structure needed)
- Extensive (lighter, low-growing plants)

Related to:

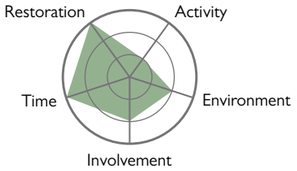
G4, A2, S1, S3, E3

Tree = Tree?

E5



The choice of tree species and location influences the effect of the restoration.



Theoretical backup

Trees with dense foliage are less preferred due to the creation of dark settings. Large and old trees are often high in preference (Kaplan et al., 1998). A single tree holds already restorative effects, yet two or more adjacent trees create a space and allow for interaction.

Practical implication

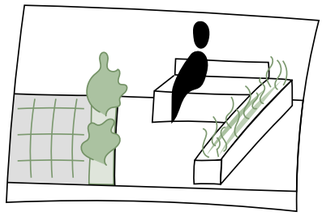
The light bark and translucent tree canopy of birch trees create a feeling of openness. Conifers release stress-reducing terpenes. Expansive tree canopies can provide a feeling of security when allowing light transmission. The interplay of wind and leaves enables involuntary attention so are e.g. poplars known for their swirling leaves due to the leaf structure.

Related to:

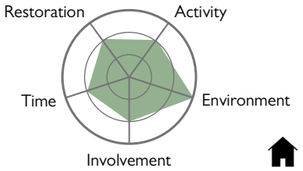
A4, S1, S5, S6

Less cars, less stress

E6



Reduced traffic and parking positively affect well-being and the quality and perception of a neighbourhood.



Theoretical backup

Traffic is one of the biggest stressors in cities, causing noise, air pollution, and dangerous situations for pedestrians and cyclists. Also, it draws direct attention intensely, leading to mental fatigue (Kaplan & Kaplan, 1989). Parking spaces are very sealed up, thus they restrict infiltration and enhance the UHI.

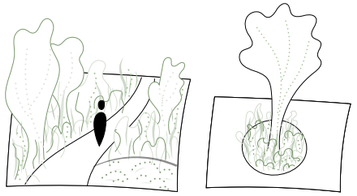
Practical implication

Making car-free alternatives more attractive by creating walkable neighbourhoods with essential infrastructures close by. Using permeable pavement for parking spaces, creating green beds with vegetation and trees if applicable in-between parking lots. Substituting parking lots with greened parklets that invite residents to meet and plant together.

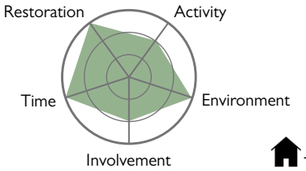
Related to:

G4, A1, A2, A3, S1, S4, E1, B3

Into the wild E7



Urban wilderness offers highly diverse restorative settings, also for temporary solutions.



Theoretical backup

Novel wild urban ecosystems hold high potential in terms of biodiversity and the provision of ecosystem services (Kowarik, 2021). Also, species-rich environments are often preferred by urban residents (Fischer & Kowarik, 2018). Those heterogeneous environments provide niches for various species (Sukopp, 1996). Urban wilderness can be mysterious and fascinating and thus contributes to restoration.

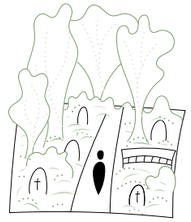
Practical implication

Vacant lots („Brachen“) and unused rail tracks often form the basis for urban wilderness but also by planting diversely, a green space is perceived more positively and a longer flowering period is ensured to attract more species. Avoid mowing areas in their entirety.

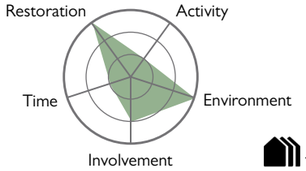
Related to:

G4, A1, S3, S5, S6, E8

Rest in peace E8



Cemeteries function as quiet urban oases for resting and as a habitat for various species.



Theoretical backup

The natural and quiet character of cemeteries makes them a valuable place for restoration while holding high values of cultural heritage and biodiversity (Straka et al., 2022). Historical cemeteries often develop into urban woodlands. Thus they are an important part of urban green infrastructure (Kowarik et al., 2016). Also, various animals find shelter at cemeteries (Vink et al., 2017).

Practical implication

Opening up un-used former cemeteries for public purposes and transforming them into park-like spaces. Making existing and operating cemeteries more accessible by providing spaces to stay in designated areas while respecting the peace of the dead.

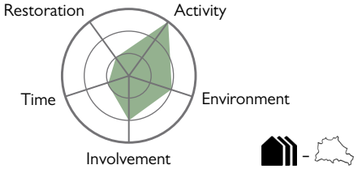
Related to:

G4, S4, S5, S6, E7, B1

IMPLEMENTATION

What do you think? I1

Incorperating public interests while making planning decisions for nature-based design strenghtens the feeling of inclusion, which is important for social well-being.



Theoretical backup

Engaging people to contribute with their ideas to the design, planning, and management of an area improves the resulting outcome, and leads to higher identification, and self-esteem. Therefore, it is an essential part of the planning and design process (Kaplan et al., 1998). Also, it ensures higher responsibility for the following maintenance.

Practical implication

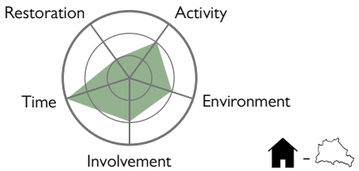
Participation should start early in the process and involve many by making information easily understandable. In form of workshops with group discussions or street activities, people give their opinion. It is important to offer a variety of solutions rather to just ask: what do you want? Using graphic material and models to facilitate the conversation.

Related to:

G3, I2; participation should always be part of decision making

Alliances I2

Interdisciplinary cooperation and knowledge exchange facilitates a better realisation of restorative interventions and raises awareness.



Theoretical backup

Professionals from different fields and non-professionals have varying expertise but often the knowledge stays within one sector. Fostering a better exchange between stakeholders improves the long term quality of a project by learning from each other, covering different interests, and managing conflicts more easily (Hansen et al., 2017).

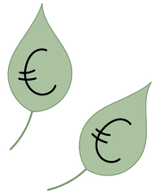
Practical implication

Ensuring the cooperation of state and non-state as well as local, communal and regional stakeholders including departments of urban and landscape planning, health, social affairs, transport, sports; residents; associations of nature preservation, environmental education; companies, social institutions, investors, housing associations and many more.

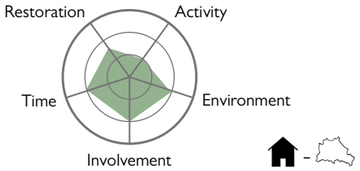
Related to:

G3, I1

Saving money I3



Investing in nature brings economic benefits and increases the value of an area while improving livability and urban climate.



Theoretical backup

The benefits of trees outweigh the costs of planting them and a park nearby increases the market value of a home (Beatley, 2016). Therefore, the investment in urban nature not only contributes to various ecosystem services like health improvements and benefits for the urban climate but also enables a reduction of costs caused by health-affecting stressors (Kowarik et al., 2016).

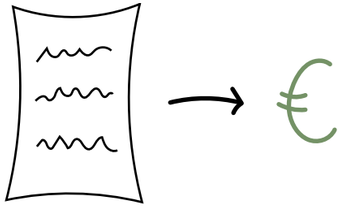
Practical implication

When investing in parks, street trees, and other green spaces, next to the contribution to ecosystem services, the economic benefits should be considered as well, which offers a basis for negotiation with investors.

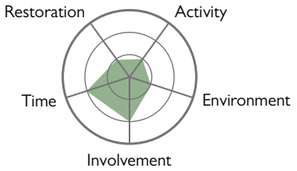
Related to:

A1, A4, E1, S1, I4

Funding I4



Specific funding programs for sustainable development support the financing of restorative environments.



Theoretical backup

Several programs offer subsidies for projects that contribute to the qualification of urban nature and climate change adaptation.

Practical implication

Selection of available funding programs:

- BENE II (Berlin's program for sustainable development, 2021-2027): climate adaptation, urban nature, green & blue infrastructure
- LIFE Programme (EU): nature & biodiversity, climate change mitigation
- GründachPLUS (Berlin, 2023-2024): Funding of roof and façade greening in several areas in Berlin

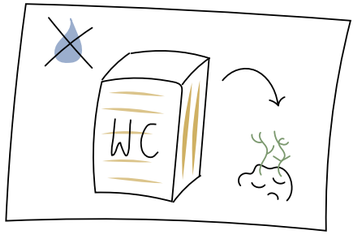
Related to:

I3; applies to everything that needs funding

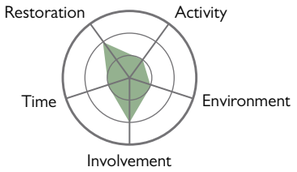
BONUS

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

Free pee B1



Public (eco-) toilets at urban green spaces enhance the quality of stay.



Theoretical backup

Ensuring equal accessibility of urban green spaces and enabling a longer stay by providing public toilets for everyone free of charge. Consequently, more people get the opportunity to enjoy a restorative setting like a park.

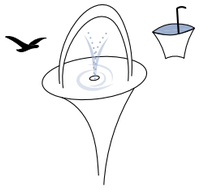
Practical implication

Self-sufficient eco-toilets are low-threshold solutions that are fast assemblable, reduce water consumption and consist of more sustainable materials. As no fundament is needed, less surface gets sealed up. Eventually, compost is produced that can be used again for planting purposes.

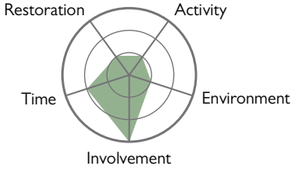
Related to:

A1, A3, S4, E2, E8, B2

Free drink B2



Drinking fountains and water pumps in public places are essential for ensuring healthy lifes and plant watering, especially in hot periods.



Theoretical backup

Heat waves and drought occur increasingly in cities, negatively affecting the health of humans and nature. Access to clean drinking water helps hydrate on hot days, and water pumps facilitate the watering of street trees (AG.Urban, 2022).

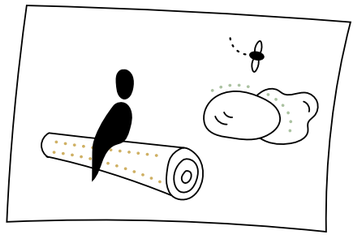
Practical implication

Maintaining existing water pumps in streets and implementing drinking fountains as part of the street furniture at urban green spaces. Choosing drinking fountains that deliver water on demand instead of a constant water flow to avoid wasting water.

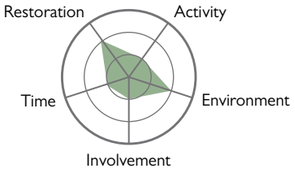
Related to:

A1, A3, A4, E2, B1

Material matters B3



Natural materials enhance restoration and compatibility with urban nature.



Theoretical backup

Materials that can be found already in natural environments contribute to restoration as they prevent additional distraction (Kaplan et al., 1998). Additionally, natural materials offer shelter for insects.

Practical implication

Using wooden benches, logs, and boulders for seating furniture. Natural stone steps and wooden fences are more compatible with a setting than concrete or artificial materials.

Related to:

A3, S1, S2, E6

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