Design Guidelines for Contemplative Landscapes

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NATIONAL
PARKS

Dr. Agnieszka Olszewska-GUIZZO is a landscape architect and neuroscience researcher. She received her Ph.D. from the University of Porto, Portugal in Landscape Architecture and Urban Ecology. During her doctoral work entitled "Contemplative Values of Urban Parks and Gardens: Applying Neuroscience to Landscape Architecture", she combined neuroscience knowledge and landscape design theory, and conducted her first experiments, examining the brain response to different landscape scenes from around Europe and the USA. She has introduced and operationalized the concept of contemplative landscapes through the development of a tool called the Contemplative Landscape Model (CLM)—a quantitative expert-based scale for assessing and classifying landscape views based on their potential to generate mental health benefits in green space users through passive exposure. Most of her post-doctoral academic work has taken place in Singapore where she conducted research with the National University of Singapore and National Parks Board. In 2021 she was awarded a CUGE Fellowship from the Singapore National Parks Board for further development of the Contemplative Landscape Model. She is a Co-founder and Lead Researcher at NeuroLandscape NGO and a Fellow of the Center for Design and Mental Health.

Ms. Alicia SOH is the Senior Manager of National Parks, Gardens and Nature Reserves at the National Parks Board, Singapore. She has more than nine years of experience in landscape architecture and multidisciplinary design collaboration. Her projects involve a range of designs for parks, gardens, infrastructure and urban master planning, with a focus on Therapeutic design in recent years. The projects that she has worked on includes Woodlands Health Campus, Pasir Ris Park Therapeutic Garden and Orchard Road Masterplan. Her design approach is focused on addressing the needs of the target user group and accommodating these needs into the design to create inclusive spaces for people. She holds a Degree in Landscape Architecture from The University of Western Australia and is currently a Certified Practicing Horticulturist.

Dr. Angelia SIA is the Deputy Director of Research at the National Parks Board, Singapore. She received her PhD degree from the National University of Singapore (NUS), Yong Loo Lin School of Medicine. Her research investigates the interactions between people and nature in cities, and the associated well-being benefits. Angelia received her first degree from the NUS and Master of Business Administration from Imperial College London. Apart from research, she has interest in writing and is the chief editor of the award-winning magazine CITYGREEN.

Jason WRIGHT is the Director of Design at the National Parks Board with more than 15 years of experience in landscape architecture and multidisciplinary design practice. His projects involve a wide spectrum of designs for parks, gardens, infrastructure and urban master planning. His completed projects include designing Si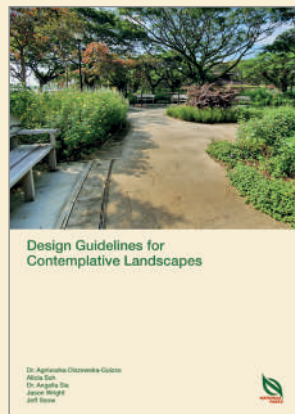ngapore's garden at the World Horticulture Expo in Beijing, master planning the Round Island Route and master planning Fort Canning Park. His design approach is to extract the natural and cultural essence of a landscape, then overlay these qualities with visitor's aspirations to transform spaces into desirable and liveable places. He holds a Master of Landscape Architecture from The University of Gloucestershire, and is an Accredited Landscape Architect in both the United Kingdom and Singapore.

Jeff SEOW is the Director of Research at the Centre for Urban Greenery and Ecology (CUGE), National Parks Board. He leads a team of researchers to drive the centre's efforts to build research expertise and knowledge in areas pertinent to urban ecology and greenery, including arboriculture, urban ecosystems, sustainable landscaping and people-nature interactions. He is also an International Society of Arboriculture certified arborist.

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Dr. Agnieszka Olszewska-Guizzo
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Foreword

Singapore is widely recognised as one of the greenest cities in the world. Tree-lined streets, a network of park connectors, green corridors, coupled with some 400 parks and four nature reserves, contribute towards an attractive and quality living environment. Today, as we build on our past efforts to transform Singapore into a City in Nature, we will infuse nature into our urbanscape with two objectives in mind: conserving nature and bringing the benefits of living amidst nature to everyone.

The link between nature exposure and well-being has been widely documented. To answer the important question on how nature landscapes can be designed in support of mental well-being, we recently undertook research in partnership with the National University of Singapore. The study, *Effects of Landscapes on Brain Activity*, leveraged multidisciplinary knowledge in the fields of landscape architecture and neuroscience to investigate green spaces with an expert-based Contemplative Landscape Model instrument. This provided insights on how landscape features can bring about positive mental well-being outcomes.

This book is a translation of our research findings into design application. I hope the guidelines presented here will help landscape professionals design and implement landscapes that enhance mental well-being, for a more liveable Singapore.

Kenneth Er
Chief Executive Officer
National Parks Board

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Introduction

Objective

Through the application of the Contemplative Landscape Model (CLM), this book aims to help landscape professionals design and implement contemplative landscapes that can enhance the mental well-being of city dwellers.

Audience

The guidelines are targeted at professionals and students trained in landscape architecture, urban planning, and architecture.

> **Contemplative Landscape Model
> and its relationship with existing frameworks**

The CLM is a landscape quality tool that has been calibrated for use on urban green spaces. As opposed to most other green spaces assessment instruments which tend to evaluate amenities in parks areas or differentiate rural and cultural landscapes, the CLM directs the evaluator's attention to a smaller scale, that of an urban park or garden, and relates to the surrounding urban infrastructures. It fills the knowledge gap about the visual and design aspects of the urban parks and gardens, which have an unconscious and psychological influence on people´s mental health and well-being.

Two early landscape quality assessment tools are the Visual Resources Inventory (VRI) tool, developed by US Bureau of Land Management for evaluation and management of the vast areas of natural reserves (Bureau of Land Management, 1986) and the Scenic Beauty Estimation (SBE, Daniel, 1976). The former is an expert-based tool for classifying scenic values of the landscapes according to several categories, while the latter is a public-based questionnaire, scoring the perceived level of scenic beauty in the observed slide. Both tools are not applicable in dense, urban landscapes, and do not evaluate health and well-being outcomes. Another public-based tool is the Perceived Restorativeness Scale (PRS, Hartig et al., 1997). Developed based on the Attention Restoration Theory, the PRS targets health outcomes, but does not inform landscape design as it focuses on self-reported feelings about the landscape setting among the public.

There are also efforts to assess landscapes using an operational approach. The Tranquility Rating Prediction Tool (TRAPT), developed in the United Kingdom, measures the tranquility of a landscape as a function of only two parameters – noise levels and the percentage of natural elements within the view (Pheasant et al., 2010). Originally developed for countryside landscape assessment, it was subsequently extended for urban green spaces. While tranquility is a condition for landscape contemplation, including only its two prerequisites seems inadequate to inform salutogenic landscape design to its fullest spatial context. More detailed approach in terms of recognition of spatial characteristics of urban spaces for quality of life (that is directly contributing to health and wellbeing), can be found in more modern frameworks including Natural Environment Scoring Tool (NEST, Gidlow et al., 2018) and uRban grEen spaCe qualITy Assessment tooL (RECITAL, Knobel et al., 2021). They address the whole range of aspects of the green space, including, accessibility, amenities, safety. While aesthetics is also reflected, it is only evaluated in terms of number, presence, and level of maintenance of a given feature.

The CLM is the only tool that aims to comprehensively address the features of landscape design and have been validated against mental health outcomes.

Applications

The CLM is a paper-based instrument that can be taken to outdoor sites to evaluate single scenes or multiple settings, for example along the walking path. It also works well with digital representations of landscapes, such as digital photos.

This book elaborates the background and specifics of the CLM, and answers the following questions:

- What type of urban greenspace design promotes good mental health?

- Which landscape design features should be prioritized for various outcomes? (e.g., promoting positive brain activity response and/or self-reported positive emotions towards the landscapes)

Contemplative Landscape Model Research

The Contemplative Landscape Model (CLM) was conceptualized and operationalized in 2011, by Dr. Agnieszka Olszewska-Guizzo, as part of her doctoral research in Landscape Architecture and Urban Ecology. Her research was inspired by the notion that among the plethora of different types and components of landscape scenes, there are certain physical attributes or sets of attributes that are more significant than others, in influencing mental health and well-being outcomes.

Upon a thorough literature review on the topics of landscape perceptions and theories of landscape design, as well as visiting dozens of case studies around the globe, a set of potential contemplative attributes was identified. This prototype set of landscape attributes was grouped into categories, translated into a questionnaire, and put through a validity and reliability test, during which a panel of ten respectable experts in landscape architecture used it to evaluate 40 landscape scenes. The process determined which were the items that matched the experts' comprehension of the topic (inter-rater agreement reliability measure) and whether 'contemplativeness', as a construct, matched what landscape architects understood it to be (validity test). As a result, the attributes that did not contribute significantly to the overall score were excluded, resulting in the CLM questionnaire in 2015. The reliability and validity tests of the CLM had reported high reliability (Cronbach's alpha=0.82, Inter-class correlation p<.01) and validity (strong positive correlation r=0.77) scores (Olszewska et al., 2016).

In 2022, in conjunction with the *Effects of Landscapes on Brain Activity* study, the CLM questionnaire underwent a minor revision to include several improvements. This exercise was conducted as part of Dr. Agnieszka Olszewska-Guizzo's fellowship program supported by the National Parks Board. The validity and reliability of the revised CLM was tested with 13 independent experts, yielding better reliability (Cronbach's alpha=0.89) than the original version.

Furthermore, the validity of the revised CLM has been tested against the neuro-psychophysiological data acquired though the *Effects of Landscapes on the Brain* study. The results indicated that the scores were highly positively correlated with four psychophysiological measures:

- Frontal Theta oscillations associated with mindfulness state (r=.85)

- Frontal Alpha oscillations associated with relaxation state (r=.68)

- Valence associated with feeling of pleasantness (r=.89)

- Arousal associated with positive excitement (r=.76)

To date, two neuroscientific studies have validated that exposure of individuals to contemplative landscapes resulted in positive impacts on their mental health. The first study was conducted in Europe, in affiliation with the University of Porto (Olszewska et al., 2016), whereas the second study was conducted in Singapore, in affiliation with the National University of Singapore and National Parks Board (Olszewska-Guizzo et al., 2021; Olszewska-Guizzo et al., 2020).

The study in Singapore showed that the CLM is a suitable tool that predicted the positive arousal and valence in people perceiving landscape views, indicative of their preference/pleasantness response. Furthermore, it demonstrated good correlation with the low frequency brainwaves in the frontal brain (Theta), a measure associated with decreased cognitive strain, relaxation, and mindfulness. The results infer that designing landscape views according to the CLM principles will most likely induce these responses in most observers subconsciously (Olszewska-Guizzo et al., 2022).

In subsequent sections of this design guidelines, there are practical applications and examples to illustrate how the CLM scores can be increased in typical urban green spaces in Singapore.

How to score landscapes with the Contemplative Landscape Model

The Contemplative Landscape Model (CLM) comprises seven key components: Layers of the Landscape, Landform, Biodiversity, Colour & Light, Compatibility, Archetypal Elements (such as water features, paths, clearing, hills, single old tree, stone, forest) and Character of Peace and Silence. This is summarized in the figure in the following page. The rest of this chapter describes the details of each landscape component in the CLM, and its application.

Application Notes

* An expert-based, validated tool for visual quality assessment of urban green spaces.

* For on-site use or photo representations (for the photos: to imagine as if you were there).

* Do NOT rate the quality of photography, weather conditions or personal preference.

* Evaluate given landscape view according to seven categories described in table below, by scoring them from 1 to 6 points. Note, that two scores correspond to one description, which means you will need to decide which score fits better based on your expert's evaluation of the scene.

Part III

The Contemplative Landscape Model (CLM)

	Layers of the Landscape	Landform	Biodiversity	Colour & Light	Compatibility	Archetypal Elements[4]	Character of Peace & Silence
6 / 5	·Far-distance view (≥400m) ·Fore, middle & background visible ·Layers greatly enhance the visual quality	·Undulating ·Natural lines ·Stimulation to look up to the sky	·High diversity of plant & animal species ·Vegetation seems native & spontaneous ·Visible changes & motion[1]	·Harmonious, natural, broken or warm colours ·Visibility of light & shade[3]	·Physical & visual relations between elements are worked out ·Explicit spatial order, simplicity, harmony between natural & created	·Strongly influence overall perception	·Explicit ·Contrast to urban environment ·Accessible & safe ·No technology ·Invites to rest and relax ·Gives sense of solitude
4 / 3	·Layers moderately enhance the overall visual quality	·Landform is not very significant to the setting OR ·Hard to say	·Moderate diversity of species ·Moderate changes & motion	·Moderate amount of contrasting colours ·Moderate amount of light & shade	·Physical & visual relations are unclear OR ·Some elements disturbing the harmony & balance	·Are present but not important for the overall perception	·Moderate AND/OR ·Moderate sense of solitude AND/OR ·Less contrast with urban environment
2 / 1	·Layers are not visible OR ·Layers do not enhance the overall visual quality	·Flat OR ·Rugged	·Low diversity of species ·No visible changes or motions OR ·Presence of bio-phobic phenomena[2]	·Lots of vivid contrasting colours ·Light & shade not visible	·Physical & visual relations not worked out well or not at all OR ·Chaos, clutter, lack of harmony	·No archetypal elements	·No character of peace & silence ·Busy ·No contrast with urban environment

[1]Dynamic natural phenomea, e.g., seasonal diurnal changes of vegetation, flying birds, bees, etc. Ignore this point for photo evaluation.

[2]Biophobic phenomena include, but are not limited to, snakes, spiders, darkness, etc.

[3]In case of overcast weather, imagine the sunny conditions.

[4]Archetypal elements include water (still or running water body, waterfall, sea), path, clearing, mountain/hill, single old tree, stone, forest, desert, grave, circle, dome, arc.

Part III

This refers to the depth of the view and whether we can see the fore-, middle- and back-ground in the given landscape. If the three layers are visible and long-distance vista dominates the scene, the landscape should be highly contemplative. This is based on the principle that the feeling of the physical distance in space triggers the psychological distance from stress and worries of everyday life, which was also reflected in the prospect-refuge theory (Appleton, 1996).

Rajecke Teplice, Thermal Baths Park, Slovakia

II. Landform

When the landscape view stimulates our eyes to look up towards the sky, through diversified skyline or water mirror, we are experiencing another important attribute of a highly contemplative landscape. Natural topography and landform with undulating lines, natural mounds, and asymmetry promotes restoration of depleted attention, which can be explained by Biophilia Hypothesis (Kellert & Wilson, 1993). On the other hand, scenes where the land is flat, divided by straight lines and geometric figures, or rugged (sharp and unwelcoming to a visitor), will score low in this category.

New Castle Waterfront, New South Wales, Australia

III. Biodiversity

Plants and animals visible in the scene bring life to the landscape as they are constantly changing. More dynamic changes (motions) are visible in animals such as bees, butterflies, birds. Plants move and change along days and seasons, reminding us of the natural cycles which we are a part of as well. Plants that seem self-sown and not overly tended are typical of contemplative landscapes. Scenes rich and diverse in species of plants also amplify the contemplativeness. The bio-phobic phenomena, that are commonly associated with threat, is an exception that should be accounted for within this category. They include, but are not limited to, snakes, spiders, and darkness.

Quinta da Aveleda, Penafiel, Portugal

IV. Colour & Light

Viewpoints situated away from direct sun exposure are most contemplative. This notion aligns with the evolution-based preference of sheltered viewing points, so called 'womb with a view' (Buss, 2000). From there, one can observe shadows changing with the passage of the sun. The play of light and shade makes the landscape appear more animated and alive. Colours that are neither overexposed nor oversaturated are ideal for relaxation.

Forest Park, Konstancin-Jeziorna, Poland

Part III
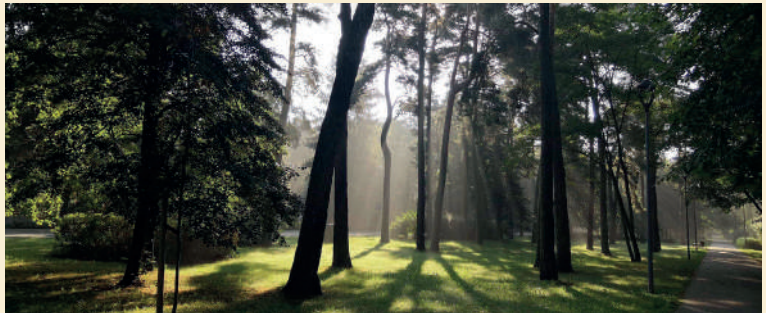
The lack of distracting elements, spatial order and harmony are evaluated here. The scene would score higher if the visual relations, scales, and proportions of elements are worked out well and the space is well maintained. Additionally, scenes with visible inward spatial orientation (*e.g., focusing on a center that dominates*) promote contemplation by fostering self-reflection. The explicit balance between natural and man-made elements is another important aspect to be evaluated within this category.

Parchi Di Nervi,
Genoa, Italy

VI. Archetypal elements

There are certain special elements of the landscape loaded with symbolic and universal meaning, collectively shared among all humans. They are part of our collective unconscious (Jung, 1964; Jung, 2014). A number of these archetypal elements have their origin in nature, such as water (*still or running body of water, waterfall, sea*), path and clearing, mountain/hilltop, an old tree, a stone, and forest. The dominating presence of such elements within the view subconsciously evokes an emotional response and promotes contemplation.

Royal Botanic
Garden Sydney,
Australia

VII. Character of Peace and Silence

Landscapes that are contrasting to the busy, urban life are the most beneficial to urbanites. Places that invite resting and relaxation provide comfort and a sense of solitude. Sense of safety and lack of technology infrastructure offer the sense of being away from the city and are aspects that bring up the score in this category.

Freeway Park &
Convention Center,
Seattle, OR, USA

The CLM scoring system

Each of the seven components can be scored on a scale from 1 to 6 points, where 6 indicates the highest quality of that specific feature, and 1 indicates the lowest quality or non-existent feature. To compute the total CLM score of a landscape scene, the average score of all the features is computed.

Optimizing landscape features

Sometimes, the site does not practically allow for the incorporation of too many contemplative features in the view, and some tradeoffs must be considered. In such situations, designers may refer to the optimized prioritization chart below (developed based on the research findings on public preference scoring, and their brainwave patterns), to select which features to prioritize in their projects.

Prioritization of
contemplative
landscape
components for
wellbeing

LAYERS OF THE LANDSCAPE

CHARACTER OF PEACE & SILENCE

ARCHETYPAL ELEMENTS

BIODIVERSITY

COLOUR & LIGHT

LANDFORM

COMPATIBILITY
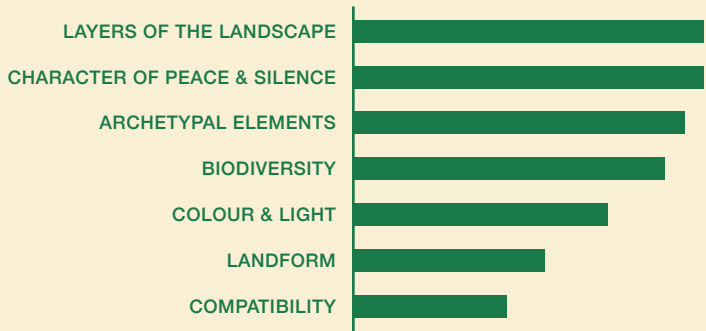
Research Study in Singapore
The Investigated Sites

In the research study in Singapore, three public spaces—two green spaces and one with negligible vegetation were investigated. Within each site, three distinct scenes were selected. The scenes in the two green spaces, the Therapeutic Garden @HortPark and a Residential Garden, were scored with the CLM. This chapter describes the scoring and corresponding characteristics of each CLM component in the six landscape scenes, with suggestions on how to potentially increase the contemplative quality of those scenes with relatively CLM scores.

The site with negligible vegetation, which functioned as the control to capture the mental response of participants, was not scored, as the CLM is specifically designed for the evaluation of green spaces. This site is in the central district near Chinatown and the busy Mass Rapid Transit interchange station, representing the fully urbanized non-iconic scene of a busy downtown area with little to no natural elements. The scenes selected for this site were dominated by crowds of people, streets with high traffic, and lots of grey infrastructure.

I. Therapeutic Garden @ HortPark

The therapeutic garden is designed as an intimate green space for relaxation. There are adequate wide-canopy trees that provide shade, as well as groupings of plants that stimulate the senses. Benches are aptly spaced, with views toward softly fascinating landscapes in the surroundings. The careful placement of seats facilitates nature contemplation and relaxation. Calming features, such as a watermill and chimes, are installed to promote a sense of peace and wellbeing.

The Therapeutic Garden @HortPark represents a highly contemplative site, with two scenes scored above the 4.45 point in CLM. This is the threshold score reflective of a highly contemplative scene, according to previous study (Olszewska-Guizzo et al., 2018). Each of the seven CLM features were well-represented in at least one of the three scenes.

Part IV

Therapeutic
Garden Scene 1.1

Average CLM score		**4.93**
Layers of the Landscape		5.0
✔ Visibility of fore, mid and background		
Landform		3.5
✔ Natural asymmetry	✔ Presence of mounds	
Biodiversity		5.5
✔ Changing vegetation	✔ Rich in species	
✔ High degree of naturalness		
Colour and Light		5.0
✔ Point of view in shaded area	✔ Warm colours	
✔ Visible shade movements		
Compatibility		5.0
✔ Openings and closings of views well worked out	✔ Physical and visual relations worked out	
✔ Spatial order, absence of disturbing stimuli		
Archetypal Elements		5.0
✔ Path	✔ Single old tree	
Character of Peace and Silence		5.5
✔ Contrast with urban environment	✔ Inviting to rest and relax	
✔ Gives sense of solitude	✔ Gives reorientation from everyday life	

Part IV

Therapeutic
Garden Scene 1.2

Average CLM score		5.64
Layers of the Landscape		6.0
✔ Long distance view (≥400m)	✔ Visibility of fore, mid & background	
Landform		5.0
✔ Natural asymmetry	✔ Presence of mounds	
✔ Stimulation to look up to the sky		
Biodiversity		6.0
✔ Changing vegetation	✔ Rich in species	
✔ High degree of naturalness		
Colour and Light		5.5
✔ Point of view in shaded area	✔ Warm colours	
✔ Visible shade movements		
Compatibility		5.5
✔ Openings and closings of views well worked out	✔ Physical and visual relations worked out	
✔ Spatial order, absence of disturbing stimuli	✔ Signage elements in hierarchical relation to each other	
Archetypal Elements		6.0
✔ Path	✔ Water sound	
✔ Single old tree	✔ Hill	
Character of Peace and Silence		5.5
✔ Contrast with urban environment	✔ Inviting to rest and relax	
✔ Gives sense of solitude	✔ Gives reorientation from everyday life	

Therapeutic
Garden Scene 1.3

Average CLM score	3.79
Layers of the Landscape	4.0
✔ Visibility of fore, mid and background	
Suggested Intervention: Opening the view or placing the viewing point so that more of the landscape layers behind are visible.	
Landform	2.0
Suggested Intervention: Introducing biomorphic, curved shapes on the ground; opening view towards the sky, preserving natural undulating landform.	
Biodiversity	4.5
✔ High degree of naturalness	
Suggested Intervention: Introducing more diversity of plants forms, and\ or a pergola with more organic shape.	
Colour and Light	4.5
✔ Point of view in shaded area ✔ Visible shade movements	
Compatibility	3.0
✔ Physical and visual relations worked out ✔ Signage elements in hierarchical relation to each other	
Suggested Intervention: Replacing the concrete blocks on the ground with natural type of pavement (gravel, wood, stone).	
Archetypal Elements	4.0
✔ Path ✔ Stone	
Character of Peace and Silence	4.5
✔ Contrast with urban environment ✔ Gives reorientation from everyday life	
✔ Inviting to rest and relax	
Suggested Intervention: Locating the bench further from the main walking paths for more restful experience.	

Part IV

The residential roof garden above an underground parking area has a contemporary garden design. It has ample walking paths among lush greenery, garden shelters and pergolas, community farm, biking trail, and children's playground. The tested three scenes within this site have medium to low contemplative landscape scores.

Residential
Garden Scene 2.1

Average CLM score	2.36
Layers of the Landscape	**2.5**
Suggested Intervention: Placing objects of interest (e.g., flowering plants) closer to the point of view to create the foreground and opening the view to farther vista.	
Landform	**1.5**
Suggested Intervention: Creating undulating landform, mounds/ curved lines on the ground, opening view towards the sky by placing the seat backrest lower.	
Biodiversity	**2.0**
Suggested Intervention: Introducing planting that is seemingly self-sown, spontaneous looking. Providing flowering plants to attract pollinators and wildlife.	
Colour and Light	**3.5**
Suggested Intervention: Placing point of view in the shaded area, shadows to be casted on the ground by objects like branched, moving with the wind.	
Compatibility	**2.5**
Suggested Intervention: Built elements may be reorganized to increase their harmony with each other.	
Archetypal Elements	**1.5**
Suggested Intervention: Introducing a dominating archetypal element (such as a tree that stands out) would help orient a viewer in the space.	
Character of Peace and Silence	3.0
✔ Gives sense of solitude	
Suggested Intervention: Placing seat(s) for resting or relaxation.	

Residential
Garden Scene 2.2

Average CLM score	2.64
Layers of the Landscape	3.0
✔ Long distance view (≥400m)	
Landform	1.0
Suggested Intervention: Introducing curved lines on the floor, undulation on the ground, or incorporate geometrical structures with biomorphic shapes.	
Biodiversity	2.5
Suggested Intervention: Introducing more plants species with various shapes and forms, planted not in geometrical manner but rather spontaneously.	
Colour and Light	3.5
✔ Point of view is in a shaded area; nothing particularly disturbing about the colours	
Suggested Intervention: The score can be increased if the shadows are casted by the natural elements (plants), showing the movement and dynamism.	
Compatibility	3.0
Suggested Intervention: Built elements may be reorganized to show explicit spatial order and harmony.	
Archetypal Elements	2.5
✔ Clearing	
Suggested Intervention: Vegetation in the back could be planted to resemble a forest.	
Character of Peace and Silence	3.0
✔ Gives sense of solitude	
Suggested Intervention: May consider appropriate treatment to address the point of view being surrounded by multiple windows of the residential block can distract users' privacy.	

Part IV

Average CLM score	**3.36**
Layers of the Landscape	3.0
✔ Long distance view (≥400m)	
Landform	2.0
Suggested Intervention: Introducing more natural lines and asymmetry on the ground.	
Biodiversity	3.5
✔ Planting seems rich in species	
Suggested Intervention: Replacing some manicured planting with spontaneous planting in a less regular manner.	
Colour and Light	4.5
✔ Point of view in shaded area ✔ Warm colours ✔ Visible shade movements	
Compatibility	5.0
✔ Spatial order, absence of disturbing stimuli ✔ Signage elements in hierarchical relation to each other ✔ Physical and visual relations worked out	
Archetypal Elements	2.5
✔ Path	
Suggested Intervention: Introducing for example a water feature, that would help orient the space around it and introduce a focal point of attention.	
Character of Peace and Silence	3.0
✔ Gives sense of solitude	
Suggested Intervention: Creating a visual divide between the wall of windows and the point of observer to create space for more rest and relaxation.	

Design Considerations

Designing For Layers Of The Landscape

Landscape Layers is the visibility of plants and other elements in different distances to create a staggered visual with three depths of plane: fore-, middle- & back- ground. This is based on the principle that the feeling of the physical distance in space triggers the psychological distance from stress and worries of everyday life, which was also reflected in the prospect-refuge theory (Appleton, 1996). In designing for landscape layers, design principles such as opening and closing views helps to create an intentional way to allow people to appreciate the landscape. When creating an effective landscape using landscape layering, think about how the spaces will look together as a whole.

The following photos illustrate techniques in creating landscape layers:

1. Opening views – Tap on existing views of a distant landscape or feature as part of your landscape. Curate spaces or trim existing vegetation to intentionally capture vistas to a borrowed scenery such as a waterbody, forested tree line or even an architectural element.

Hampstead Wetlands Park

2. Closing views - The design of the landscape can be curated to guide your eyes into a certain angle or point within the landscape to create and direct the visitor's attention towards a particular scene or view. Combine the different landscape layers with other elements to create a landscape that flows from one part to another. Guide the person's eye to different areas of the landscape through curved landscape edges that creates continuity and depth.

3. Borrowed Scenery – By incorporating surrounding elements or distant scenery into the design of a landscape, it guides visitors to look beyond the horizon, expanding the view beyond the boundary of the space. Borrowed scenery can potentially make the landscape larger than it is tapping on elements in a distant, making it part of the landscape.

Hampstead
Wetlands Park

Designing For Landform

Incorporating landform in landscapes can lead visitors on a journey of experiences including 'mystery' through hiding views, 'awe' through opening or framing views and 'protection' through creating a refuge. This is connected to Appleton's Prospect-Refuge theory which can be condensed into an imperative to see without being seen, and a desire to be comfortably 'safe'. These experiences tap into our basic psychological instincts stimulating positive emotional responses. Designing landforms to enhance positive emotional responses is best achieved through emulating natural geometry. Nature is predominantly asymmetrical and without straight lines, and therefore landforms at all scales from small courtyards to wide open parks should follow these basic geometric principles. Landforms should consist of mounds that are sinuous with sweeping curves, graceful transitions and gentle gradients not exceeding 1:4.

The following photos illustrate techniques on how illicit a variety of experiences as visitors journey through a landscape utilising landforms:

1. Weave pathways between mounds which partially obscure the viewer's line of sight in order to create a sense of mystery and anticipation to entice the viewers to continue the journey through the landscape.

one-north Park: Fusionopolis North

2. Provide a diversity of enclosures to meet various users' emotional needs for levels of protection and security, which can span from intimate seating areas for an individual to amphitheaters for large groups.

Singapore Botanic Gardens

3. Use mounding to guide viewers' line of sight towards key features through framing features between mounds or using the geometry of the mound to lead the eye in a specific direction.

Therapeutic Garden at Bedok Reservoir Park

4. Introduce elements of surprise along the journey through the mounds such as feature plants, a bench or framing views.

Jurong Lake Gardens

5. Incorporate viewpoints on the mound¾high points that open up vistas of the landscape which can be partially sheltered in order to create the sense of 'seeing without being seen'.

Singapore
Botanic Gardens

6. Incorporate geometry that encourages skyward orientated views which can include mirroring the sky within water.

Singapore
Botanic Gardens

Part V

<u>Designing For Biodiversity</u>

Even though the urban greenspaces are predominantly man-made, they could be designed in a way to be more natural, therefore having the additional function of restoring natural processes. Vegetation is one of the most important mediums to enable city inhabitants to connect with nature, and an important feature of parks and gardens. If the vegetation is designed to be more natural and less tamed, the scene should induce more of the desirable psychological outcomes. Biodiversity and richness of species of flora and fauna should not be overlooked when considering the contemplativeness of a setting. Large areas with few similar-looking species (such as mowed lawn) will not score high in CLM, and they may be replaced with a spontaneous meadow.

Many greenspaces in Singapore embrace geometrical and structured planting plans, which do not look like they were self-sown. The forms of plants may be changed by applying a different maintenance regimen, e.g., allowing some plants to spontaneously grow without trimming or changing the shapes of planters and gazebos to those with organic shapes.

These are examples of techniques that improve biodiversity:

1. Having a diverse number of plants species directly contributes to a diverse fauna profile by providing habitat and food sources for a multitude of different fauna species. A landscape with low flora species diversity also imparts a monotonous and uninteresting feel to the landscape.

Sembawang
Hot Spring Park

2. Native plants species have the highest chance of attracting and supporting native fauna. A reasonable approach to this would be to use as much native trees as possible while allowing for a more exotic mix for the shrub layer, as native shrubs are harder to obtain in large quantities and they could be less visually interesting.

Hampstead Wetland Park

3. The above techniques should be demonstrated in a tiered planting arrangement to maximize biodiversity potential. Where possible there should be at least three layers to a planting arrangement; ground covers, shrubs and trees. Ideally a fourth layer should be added, this could be tall shrubs/ treelets or small trees. The goal is to mimic the natural structure of a forest.

Schematic representation of a tiered planting layout
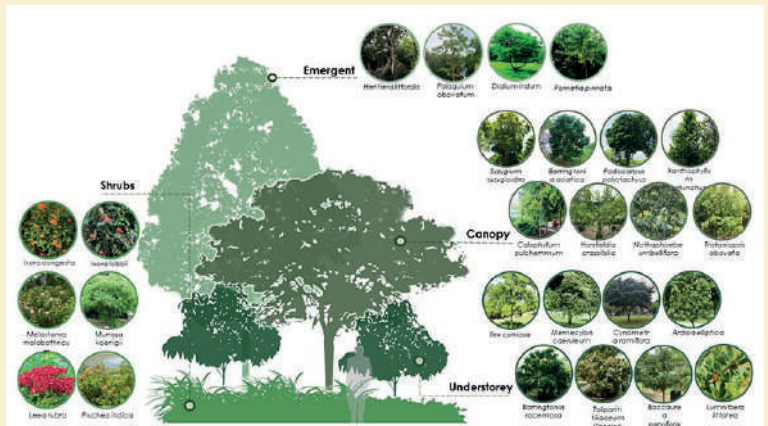
4. In our increasingly urban surroundings, green spaces are constantly being fragmented. By applying patch dynamics, fragmented landscapes (parks, green spaces) can be treated as patches and connections between them can be made via natural corridors. In instances where actual physical connections are limited, ecological stepping-stones can be utilized to bridge the gaps. This allows for the movement of fauna species between these patches and in turn improves their genetic diversity.

Graphical visualization of a patch matrix
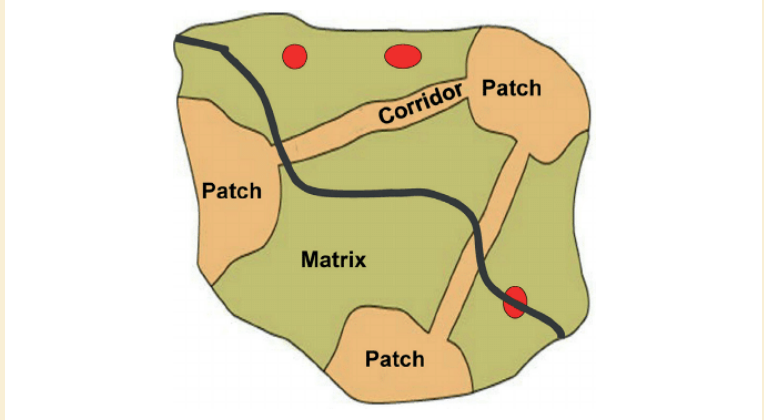
5. Before starting to design a landscape for biodiversity, it is important to understand the historical vegetation and prior landuse of the site. By tailoring plant choices to the historically known vegetation of the area, it helps restore the natural habitats, the fauna species associated with these habitats and increases the chances of the proposed landscape succeeding.

Historical maps of Khatib Bongsu showing its vegetation over the years

Designing For Colour & Light
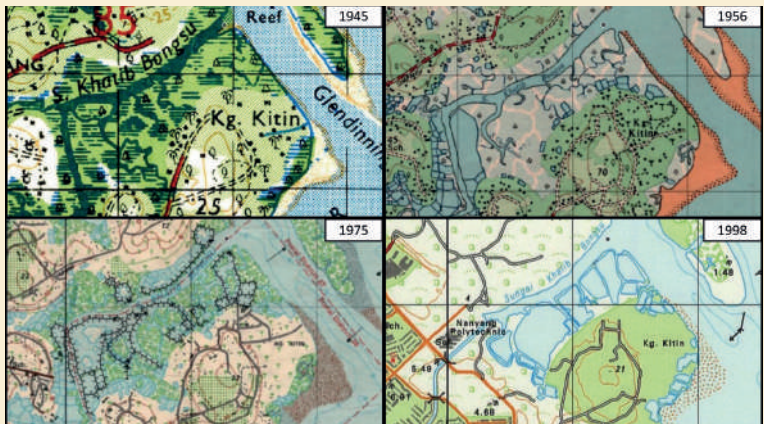
A landscape full of colour and light generates not only attention but guides the human eye through a series of experiences. The purposeful use of colours can create balance and order. Colours can be described as cool or warm, which evokes calmness or excitement. The value (which refers to its tints or shades) and intensity (which refers to strength or saturation) of colours can be expanded to create a more vibrant landscape that is aligned with the desired ambiance. Colours that are neither overexposed nor oversaturated are ideal for relaxation and contemplation. This notion aligns with the evolution-based preference for sheltered viewing points, so-called 'womb with a view' (Buss, 2000), where one can observe shadows changing with the passage of the sun.

The play of light and shade makes the landscape appear more animated and alive. Designing with colour and light requires an understanding of basic design principles and the theory of colour; although they are strong design elements that can impact psychologically, their intrinsic appeal can be inviting or unwelcoming.

The following photos illustrate techniques for a variety of experiences as visitor's journal through a landscape filled with colourful and light:

1. Use colours and light as a form of visual communication to guide viewers' line of sight towards a focal point and as wayfinding to entice the human eyes through a colourful landscape journey.

Singapore Botanic Gardens

2. Introduce colours that stimulate the mind and evoke the senses. Cool colours (blue, green, purple) elicit calm and quiet emotions, inviting visitors to linger and create a receding landscape that makes the space appear more spacious. In contrast, warm colours (red, orange, yellow) evoke energy and excitement and drawing the eye to specific closed-in spaces or welcome entrance.

Singapore
Botanic Gardens

3. Colour is temporary and ever-changing in the landscape. Introduce plants with seasonal changes in the colours and foliage to provide viewers with a continued point of attraction and richness in the landscape.

Singapore
Botanic Gardens

4. Provide various shade elements to allow a comfortable experience for the user transiting through the landscape. Elements can span from a garden trellis structure to a canopy of trees for respite.

5. Light can elevate the perception of colour in the landscape. Incorporate colourful plants away from tall shaded structures; bright light tends to magnify white and warm colours but wash out dark colours and pastels.

Part V

The compatibility of various natural and designed elements defines the visual and physical experience of spaces. The placement of buildings, landscape furniture and sculptures could either complement or contrast the natural settings of the curated open spaces. Physical and visual harmony is often created by consciously achieving spatial order of landscape elements. Designers could achieve balance in various design elements by thoughtful placement, and selection of scales and appearances. Spaces with harmonious balance of elements create tranquil user experiences. Contemplative spaces are created by strategically designing openings and closings with the help of natural and manmade elements. Although there are no strict rules on how spatial harmony could be achieved, designers could learn to create tranquil spaces by analyzing how different elements occur in untouched natural environment.

The following photos illustrate techniques on how to create spatial harmony by using compatible design elements:

1. Creating focal points: Conscious positioning of landscape elements to create unobstructed vistas and attract attention to visual focal points.

Screening plants used to avoid distraction by surrounding buildings

Serene Gardens @ Gardens by the Bay

2. Spatial order and harmony: Harmonious positioning of landscape elements to create tranquil spaces.

3. Relations between landscape elements: Curated positioning of natural and man-made elements to create pleasant visual experience of the space. Complementary presence of man-made and natural materials and patterns.

4. Compatible scales of landscape elements: Scale of landscape elements is curated such that there is no single overpowering element.

Balanced scales of signage and background planting

Singapore Botanic Gardens

Scale and positioning of seating and lighting fixtures create harmonious space

Serene Gardens @ Gardens by the Bay

5. Physical and visual relations between different landscape elements: Visitors are intrigued to explore spaces when landscape elements are placed in hierarchical relation to each other.

Signage along curving path leading to a sheltered path create hierarchical spaces and guide users to the entrance

Singapore Botanic Gardens

6. Scenes with visible inward spatial orientation: The center of the space is designed to create a focal point. Screening plants are often used to visually obstruct surrounding buildings and create inward looking spaces.

Seating and planting are designed to create inward-looking spaces to divert users' attention from surrounding buildings

Yunnan Gardens

7. Balance between natural and man-made elements: The size and proportions of the man-made elements to be in harmony with the natural elements without overpowering the natural visual quality of the space.

Shapes, textures and scale of planting and hardscape elements complement each other without overpowering one another

Capella Singapore

Designing For Archetypal Elements

When we are struggling with mental health issues, it can be extremely difficult to find meaning or connection with the physical environment. Experience of nature-derived archetypal elements can provide an entryway to feeling more connected to nature through our innate mechanism of collective subconscious, shared by all humans.

Introducing archetypal elements (e.g., water features, streams, sea(view), old tree, stone, forest) as dominants in the landscape not only enhances the positive effects of the space, facilitates wayfinding, making it easier for visitors to orient oneself in the space (specifically in the case of elderly people). The explicit presence of these elements evokes a subconscious emotional response in all humans, corresponded with relaxation patterns. In the traditional Visual Resource Management landscape quality assessment, one of the assessment categories was "scarcity"—presence of distinct and rare elements, which makes the scene more valuable. The presence of Archetypal Elements in a scene induces the relaxation pattern in the brain because of the way that they stand out from the landscape and generate the instant reward response.

The following photos illustrate techniques on how to illicit a variety of experiences as visitors journey through a landscape utilising archetypal elements:

1. Water is a very versatile element in terms of the scale, and form in which it can be incorporated into the landscapes and these two attributes impact the effect it will have on human psychology. It could bring out mild meditative /contemplative state or mindfulness in the user. Water in any form brings sensory relaxation, such as visual delight, pleasing and soothing sounds. Water has the capability of creating white noise, which assists in the process of contemplation.

Any landscape with view of calm sea can take the viewer into contemplative state due to its vastness and calmness, there is a feeling of surrender. On different scales, still pools/infinity pools can be incorporated in the design to bring in a contemplative quality. Any water feature which is vast connotes what we can't see or the infinite.

Flowing water, view of a river, or water features with moving water represents life (new life), dynamism, freshness, and movement, it has energy and bring positivity to the viewer. The sounds if rhythmic water promote the meditative mental state.

Kallang River at Bishan-Ang Mo Kio Park

Therapeutic Garden at Bedok Reservoir Park

2. A path is a relatively easy to distinguish and omni-present element of any landscape design. It can easily be adjusted to elicit emotional response in the brain, by making it distinct from the surrounding landscape. The path has a connotation to one's course through life. The examples below present two paths with distinctive characteristics.

Near Clementi Avenue:
An informal path, with semi-organic lines. The relatively narrow path contrasts with the surrounding, making its archetypal character more pronounced.

Near Clementi Avenue:
The path presents a strong and explicit archetypal element, with a narrow but visible direction towards the residential area. It is clearly distinctive from the ground cover, & naturally formed, & may stimulate strong brain response associated with the path archetype.

3. The symbols of the forest, path and clearing (an open space in a forest) can work separately or together, creating a narrative of journey to enlightenment. The symbolic meaning of the forest reaches far back in the history of our civilization "predating any language, symbol, icon or deity" (Saunders et al., 1998). Throughout human history, it has been both uplifting (calm, serene, providing shelter) and terrifying (a dark, unfamiliar place where one may be lost).

Well shaded forested areas with a path leading to a bright opening or clearing, has an explicitly contemplative meaning. Walking along the path symbolizes life's journey. The power of the clearing seems even stronger if we consider that clearings were the first contemplative gardens designed by nature. "No doubt about it, the first gardens were not made but discovered. [They were] a natural spot [such as] a clearing in the forest ... In the oldest accounts, such spots are the gardens of the gods, or those favored by the gods" (Thacker, 1985, p. 9). Today, clearings are one of the main designed elements of urban parks.

West Coast Park

Designing for character of peace and silence

Our research shows that people's preference of an urban green space is dependent on whether the space provides tranquility, comfort, serenity, and solitude. The latter may be the most challenging to achieve in the buzzling city, mainly due to the characteristic noise and crowdedness. However, there are some design strategies that can offset the negative distractions and offer visitors a space of reorientation, contrasting it against the city noise.

The following photos illustrate techniques on how to elicit a variety of experiences as visitors journey through a landscape utilising character of peace and silence:

1. Introduce vertical barriers through solid structures, soft landscape features or a combination of both to create enclosure space, screen undesirable features and to reflect and bounce sound waves back toward the source.

Singapore
Botanic Gardens

2. Terracing with lush planting which can create an intimate and peaceful hideaway.

Singapore
Botanic Gardens

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3. Use white noise from the subtle sounds of water features, flowing stream and rustling of the leaves to mask undesirable noises to create a sense of calmness.

Singapore
Botanic Gardens

Singapore
Botanic Gardens

4. Creating a visual enclosure with sources of natural sounds, which provide distraction from city noises.

Therapeutic
Garden at Punggol
Waterway Park

Case Studies

The principles in the Contemplative Landscape Model (CLM) may be applied in the landscape design process, to introduce contemplative landscape strategies into drawings. We present three case studies in this chapter, to demonstrate how generic urban green spaces adjacent to residential high-density buildings may be transformed into spaces that promote mental wellbeing, using the CLM principles. The images before and after the intervention were assessed by two separate panels of independent experts, and discussions on the assigned scores are presented.

CASE STUDY I

Before Intervention

Assessment of existing scene

Initially, the landscape scene was green but not inviting.

- The dominating element in the view was a residential building façade limiting the far-away views. There was a possibility to look farther but the eye of the observer wasn't specifically driven into the landscape, therefore the low 2.3 score for Layers of the Landscape.

- The flat surface of the lawn and lack of skyline visibility motivated low score (1.2 points) in the Landform category.

- Having only few plant species placed in manicured fashion was a reason for low score in Biodiversity category (1.8 points).

- With regards to Colour and Light, this category scored a little higher (2.5 points). There are not many distracting and saturated colours in the view. Moreover, the shades and lights are likely not visible because of the tall building nearby.

- The space organization seem random and unorderly therefore low 2.2 score for Compatibility.

- No Archetypal elements visible in the view motivate the low score in this category (1.7 points). One could argue that there is some reminiscence of a clearing, however it is far from being explicit to the observer.

- The space does not invite users to seat and relax, nor acts as a distraction from city life. However, it has some level of peacefulness in it, leading to the 2.3 score.

After Intervention

Overall, after the intervention the CLM score went up to 3.77 points from the initial 2 points.

+ After the landscape architect's intervention, the score for Layers of the Landscape increased to 3.6 points. This came from shifting the viewer's attention away from the monolithic façade into the green strip, by creating paths, and working out the view axis with tree canopy.

+ Undulating lines on the ground created the more naturalistic feel and illusion of natural topography, therefore the Landform score increased to 3.2 points.

+ The plants, even though organized in gazebos and tamed, are more diverse in species and look less manicured, which motivated the increased score for Biodiversity (3.6 points).

+ The design specifically shows the play of shadows casted on the ground from trees, and colours are predominantly natural, so the scores in Colour and Light category went up quite a bit too (4.2 points).

+ Artificial red on walls was balanced out with colours of flowering plants. This also contributed to increasing of the Compatibility score, which went up to 4.6 points. The space is now more harmonious and organized.

+ Introducing the seating contributed to increasing the Character of Peace and Silence score up (to 3.6 points).

	Layers of the Landscape	Landform	Biodiversity	Colour & Light	Compatibility	Archetypal Elements	Char. of peace and silence	TOTAL CLM score
Before	2.3	1.2	1.8	2.5	2.2	1.7	2.3	2.00
After	3.6	3.2	3.6	4.2	4.6	3.6	3.6	3.77

CASE STUDY II

Before Intervention

Assessment of existing scene

The original space was a rather narrow strip of green along the HDB block, with the view axis focused on the distant tall residential building.

Part VI

- There in fact is a long-distance view, but because it is not contributing to enhanced visual quality of the landscape, the experts attributed lower 2.3 score in the Layers of the Landscape category.

- Low 1.2 score for Landform in this scene is not surprising, because the land in flat, and there are no undulating lines. The sky is also not visible.

- Low score in Biodiversity (1.5 points) was motivated by only two visible species: lawn and line of shrubs, both being trimmed and manicured.

- Low light-shade visibility, and contrasting colours were a reason for low score (1.8 points) in this category.

- Lack of coherent and harmonious design language rendered low compatibility score (2.2 points).

- The score for Archetypal Elements was low (1.9 points) because there is no clear archetypal elements in the view.

- The lack of reorientation from the city-space as well as lack of seating or privacy of experience have likely motivated the low 2.3 score in Character of Peace and Silence category.

After Intervention

+ Overall, the scene after the intervention went up by about 3 points on the CLM scale, from 1.89 to 3.86 points.

+ After the designer's intervention, the feeling of the long-distance view changed a little because some trees were introduced at distance. The background view quality was improved and now scores 3.8 points in the Layers of the Landscape category.

Part VI

\+ Introducing some undulating lines on the ground (paths) brings a little more naturalness in the perception of Landform, therefore slight increase in this category (2.6 points).

\+ Introducing multiple and diverse plant species with colours balancing the colours of the walls of buildings, have increased the scores for the Biodiversity (4.0 points) and Colour and Light (4.4 points). Designer depicts the shadows and lights on the visualization which contributed to the latter (although it might not be realistic for most of the day, given how narrow the space is).

\+ The introduction of the path though the middle of the green strip introduces archetypal element to a space. Although it is not dominating the design, but can be noticed by the visitor, therefore the Archetypal Elements score went up (to 3.8 points).

\+ The score for the Character of Peace and Silence was increased to 3.8 points because of the new seatings, resulting in a relaxed and inviting character. It gives a feeling of being at home.

	Layers of the Landscape	Landform	Biodiversity	Colour & Light	Compatibility	Archetypal Elements	Char. of peace and silence	TOTAL CLM score
Before	2.3	1.2	1.5	1.8	2.2	1.9	2.3	1.90
After	3.8	2.6	4	4.6	4.4	3.8	3.8	3.85

CASE STUDY III

Before Intervention

Part VI

This is a green linear park along the residential high-rise building façade, leading to the street view.

- There is possibility of seeing into the landscape, but the view is not enhancing the overall visual quality, because it focuses on a street with buildings and traffic. These aspects motivate the medium score for Layers of the Landscape (3.6 points).

- The ground is flat, with exception of a slope aligning the building, which gives a sense of somewhat diverse Landform (3.1 points).

- Some mature trees are present, which dominate the site, leading to a Biodiversity score of 3.1 points. Nevertheless, the overall number of species is not large.

- The visibility of light and shade casting though the tall canopies contribute to the high (4.3 points) score for Colour and Light. In addition, the colours are not too saturated and distracting.

- In general, the space has high Compatibility and there is no spatial chaos, resulting in the score of 4.1 points in this category.

- The rows of mature trees can be recognized as one strong archetype, which led to the score of 3.2 points for the Archetype category.

- The place seems to have a character of peace and silence. The slopes and old trees somewhat invites to rest and relax, even though there is no visible seating in the picture – the score for Character of Peace and Silence was 4 points.

After Intervention

Overall, the scene after the intervention went up only a little from 3.63 to 4.26 points.

+ More visual interest is given on the extension of the view towards the street, distracting from the street itself, so the score increased to 4.2 points.

+ Asymmetrical path shapes the space topography gained more biophilic character, and the Landform score went up a little to 3.6 points.

+ Introducing variety of herbaceous plants and shrubs growing in the spontaneous-looking beds brought about more explicit naturalistic feel to the space, therefore the score for Biodiversity went up to 4.2 points.

+ Colour and Light score didn't change significantly as the light and shade casted through the trees canopy is the main value in this category but adding more natural colours from the warm palette increased it a little (4.6 points).

+ In Compatibility, the view gained some more organization, due to adding paths & elements in a balanced, well worked-out way.

+ The old tree(s) is more emphasized thanks to juxtaposing them with other elements. Moreover, there is now a clearing in the middle of the design (4.4 points for Archetypal Elements).

+ This links to the inward orientation of the space that has been introduced, and brings about the feeling of reflection and contemplation, therefore, the score for Character of Peace and Silence went up to 4.2 points. On the other hand, the space lost the sense of solitude as capacity for more visitors and activities has been introduced.

	Layers of the Landscape	Landform	Biodiversity	Colour & Light	Compatibility	Archetypal Elements	Char. of peace and silence	TOTAL CLM score
Before	3.6	3.1	3.1	4.3	4.1	3.2	4.0	3.62
After	4.2	3.6	4.2	4.6	4.6	4.4	4.2	3.77

Part VII   Conclusion

A very important aspect of city planning and design is not only to create spaces that function well, but also spaces that enhance the quality of life and well-being of city inhabitants. Designing green spaces using the CLM, as illustrated in this book, is a useful approach to create contemplative landscapes for promoting relaxation, mindfulness and positive emotions - for a more mentally healthy city.

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