

CITY GREEN

Reports

Therapeutic Horticulture
Applications by the
Industry in Singapore

Projects

Urban farming:
What is the potential for
adoption in Singapore?

Parks & Landscapes

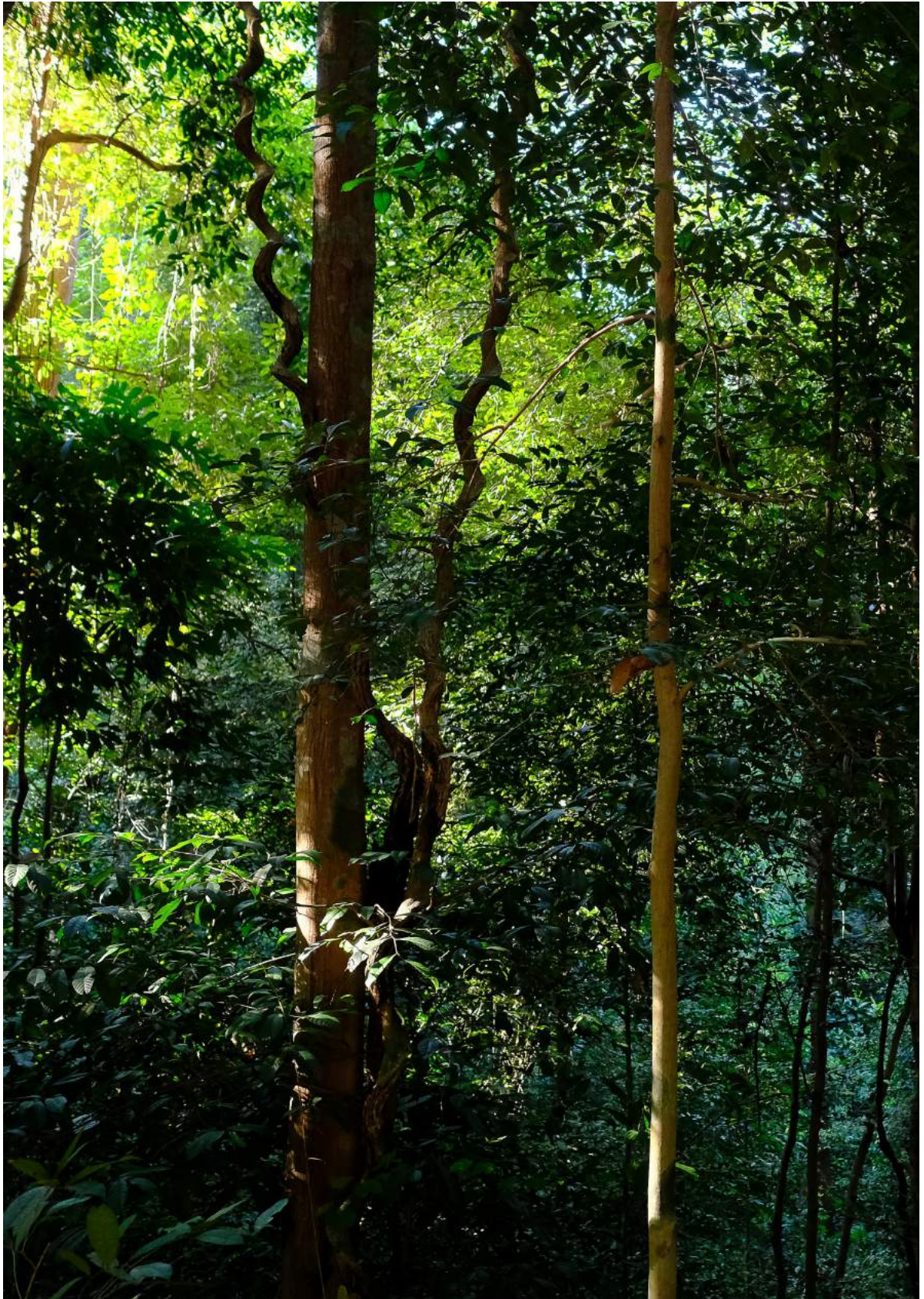
Extending Contemplative
Landscapes in a
Tropical City-state

Awards

IFLA ASIA-PAC LA
Awards 2023

Commentary

Embracing the Role of
Landscape Architects
in Climate Change
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Preface

CITY GREEN



CITYGREEN #21

Cover photo
The Bukit Timah Nature Reserve is one of Singapore’s first forest reserves. New species discoveries continued to be sighted here.

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NParks

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- Toru Terada
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“

Throughout history and across cultures, people have considered access to some form of nature as a fundamental human need, and attractive, green, and well-watered landscapes as an essential constituent of the ideal, paradisa, healthy environment. Writers from the earliest times have recognised that the landscape not only provides for our nutritional needs, it also supports us at every level in our wellbeing¹.

A growing body of research demonstrates the positive impacts of nature on people; in dimensions ranging from mental and physical health to well-being, life satisfaction and close social relationships. In this issue of *CITYGREEN*, we discuss nature’s role in enabling flourishing communities and the topic of ecological literacy in cities.

Ng et al., in their article *Extending Contemplative Landscapes in a tropical city-state*, explain the concept of Contemplative Landscapes as immersive environments for mental health promotion and illustrate its design application through case studies. Therapeutic Horticulture interventions are discussed in two articles - Tham documents industry-led applications in Singapore while American-based Wagenfeld advocates it as a nature-based allied health practice. This is complemented by Rich’s article that explores the potential of urban farming in Singapore.

“Nature heals ... if we make space and time for it².”

Increasing environmental literacy in cities helps develop a system of knowledge, values, skills, and actions related to the environment and our relationship with nature. Young et al., introduces the new undergraduate Biophilic Design programme which aims to cultivate designers capable of making a positive impact on shaping the built environment, while Endo et al. highlights the importance of embodied learning by discussing the learning points gleaned from the Memu Earth Lab Landscape Design Workshop. Hwang takes a deep dive into the issue through discussing the Role of Landscape Architects in Climate Change Mitigation with renowned experts.

A City in Nature means that it is not only home to humans but to various animal species. Chen takes readers through his research on canine and feline welfare in Singapore, with a particular focus on the rehabilitation and rehoming of free-roaming dogs and cats.

Last, this issue includes a regular feature of a selection of winners of the IFLA Asia-Pacific Landscape Architecture Awards 2023. These winning projects inspire and achieve significant impact by allowing landscapes to dominate.

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FOOTNOTES

¹ Ward Thompson, C. (2011). “Linking landscape and health: The recurring theme.” Landscape and Urban Planning 99(3-4): 187-195.

² Tan, P.Y. (2023, October 5). The Salubrity of Urban Nature: from Patterns to Mechanisms and Action [Conference presentation]. Urban Sustainability R&D Congress, Singapore.

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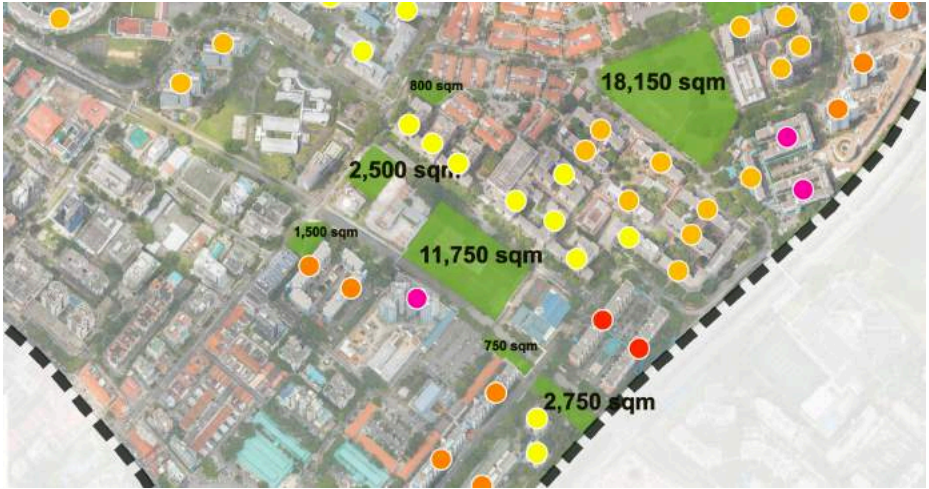
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The critical role landscape architects play in tackling climate change within urban landscapes
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AGNIESZKA OLSZEWSKA-GUIZZO, Ph.D., is a landscape architect and neuroscience researcher who developed Contemplative Landscape Model through interdisciplinary research at the University of Porto, Portugal, the University of Massachusetts-Amherst, USA, and the National University of Singapore. She is a Founder of the NeuroLandscape NGO, and a Lead Researcher in GreenME and GreenInCities Horizon Europe projects, both with vision of mentally-healthy cities. She is an author of book “Neuroscience for Designing Green Spaces - Contemplative Landscapes” and a fellow of the Centre for Urban Design and Mental Health.

AMY WAGENFELD, PhD, OTR/L, SCEM, EDAC, FAOTA is an affiliate faculty member of the Department of Landscape Architecture at the University of Washington, faculty in the Boston University Post-Professional Occupational Therapy Doctoral program, and Principal of Amy Wagenfeld | Design. A Fellow of the American Occupational Therapy Association (AOTA), Amy holds evidence-based design accreditation and certification (EDAC) through the Center for Health Design, specialty certification in environmental modifications (SCEM) through the AOTA, and certification in Healthcare Garden Design through the Chicago Botanical Garden. Amy received the AOTA Recognition of Achievement for her unique blending of occupational therapy and design. Amy is passionate about providing people of all ages, abilities, and cultures equitable, inclusive, and safe access to therapeutic environments to recreate, learn, and socialize, and recognizes that successful design must, at its core, support mental health and foster resilience.

Her work focuses on design, programming, and evaluation of environments that support lifespan physical and emotional rehabilitation and learning across in children’s, educational, healthcare, senior-living, military, correctional, and community settings. Amy presents and publishes widely and is co-author of the award winning book, Therapeutic Gardens: Design for Healing Spaces published by Timber Press in 2015.

BRONWYN TAN YUNG SIANG believes that landscape architecture is as much an art as it is a science. Be it designing for man or for nature, a holistic and systematic approach to development of site underpins her practice. She has over a decade of design experience in Singapore, South East Asia, and Europe and has spent the past several years cross-training with ecologists working on environmental impact assessments, water-sensitive urban design and biodiversity-sensitive urban design.

JASON WRIGHT is the Director of Design at the National Parks Board with more than 17 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 Singapore’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 Singapore and the United Kingdom.

KENYA ENDO is a landscape architect and lecturer at National University of Singapore, Department of Architecture. He is interested in designs interrelated with landscape infrastructure and urban hydrology. During his 6 years of practice in Singapore, Kenya has worked on numbers of inter-disciplinary projects in South-East Asia, with the focus on creating livable spaces that integrates infrastructural, ecological and social values. He obtained his Master’s in Environmental Studies from the University of Tokyo, and Master’s in Landscape Architecture from Harvard University. His design works have been recognized in a number of international awards including OnePrize Stormproof 2013, Holcim Award for Sustainable Development 2014. He is an accredited landscape architect in Singapore.

KUAN CHEE YUNG was awarded BCA-SGBC Green Architect of the Year 2017, has 28 years practicing architecture, master planning, interior design, product design and landscape integration. He was Founder & Managing Director of CPG Signature Pte Ltd (IFLA 2021 & 2022 Award Winner), and VIA+Signature Pte Ltd (First SR Kellert Biophilic Design Award Winner, 2017) , Project Director in CPG Consultants, Director of PM Link Malaysia and has strategised with governments on key institutional developments (TODs/Campuses/ Attractions/Nature Conservation Masterplans) and developers on various UX & Business catalyst driven Townships. He is currently Global Lead, Place Innovation at Consulus Pte. Ltd., a global Change by Design Firm, founding VP of Think & Act society, The Circle for Human Sustainability, adjunct lecturer & curriculum writer, BOA examiner and Standing Committee member for SGBC’s Green Mark Professional Qualification.

MAGDA RICH, PhD is Coordinator of International and Domestic Outreach at College of Veterinary Medicine and an Adjunct Instructor in the Master of International Agriculture Program at the Ferguson College of Agriculture, both at Oklahoma State University. She received her Master of Science degree in Architecture and Urban Planning in 2012 at the Czech Technical University in Prague, Czech Republic. Since then, she has worked as a researcher in interdisciplinary teams on a variety of agri-food and land use planning projects in Norway, Czech Republic, India, UK and New Zealand. Throughout those years, she worked on her PhD project, “The Healing City”: Adaptation of care farming principles in dense urban areas, under supervision of Prof Andre Viljoen at the University of Brighton, which she completed in 2023. She is an advocate of enhancing urban resilience through the diversification of food systems. She believes that productive agricultural areas can be sustainably integrated in the dense urban fabric in ways that can help cities respond to the dynamics of our rapidly changing world. She is particularly interested in the active engagement of older urban residents in horticultural activities and seeks to integrate the care farming concept in urban planning strategies to promote their health benefits.

PARK HYE YOUNG, in her role as Deputy Associate Dean, School of 3D Design at Nanyang Academy of Fine Arts, leads spatial design programs and serves as the Course Leader for the Biophilic Design Programme that is developed under the alliance of NAFA and UAS. Her dynamic position involves shaping students into future leaders in spatial design. Beyond academic leadership, she actively participates in curriculum development, guiding students through urban complexities and fostering an environment where creativity, sustainability, and industry collaboration converge for a potent learning experience. Hye Young's influence is pivotal, seamlessly integrating industry insights into cutting-edge curriculum, addressing contemporary urban challenges, and cultivating a forward-thinking educational atmosphere within the Faculty of Art and Design.

PAUL CHEN, Ph.D., is a Scientist at the Centre for Animal Rehabilitation, with the Animal and Veterinary Service, a cluster managed by the National Parks Board, Singapore. Specialising in behavioural biology, Paul focuses on innovative methods to assess and enhance the welfare of shelter animals, particularly cats and dogs. His research includes developing behavioural assays for shelter cats and using faecal cortisol metabolites levels as an indicator for dogs' adaptability to shelter conditions. Paul's work is published and presented at international conferences, contributing significantly to advancements in animal welfare.

PAULINE ANG SU-PING is a practising architect who splits her time between design, research, and teaching. She obtained her M. Arch from Columbia University in New York and has since worked on a broad range of projects in Singapore and other parts of the world. As the Director of the Design and Research Office (DRO) at CPG Corporation, she leads the development of impactful design strategies and solutions for the built environment through practice-based research and built work, often in collaboration with other industry professionals and partners, and tertiary institutions.

THAM XIN KAI is the Founder and Principal of Terrapy SG, an enterprise for good that promotes a holistic approach in addressing issues of health and well-being through nature-based interventions using horticultural therapy, therapeutic horticulture, and therapeutic garden design. He was also Co-founder and former Director of Hortherapeutics. With a background in Landscape Architecture, Xin Kai has an interest in research and design of landscapes that exhibits the therapeutic effects of natural elements, in particular, he has been studying the attributes of various types of oriental gardens that promote the mental wellbeing of people. His experiences in the design and development of therapeutic gardens began during his employment at the National Parks Board, Singapore. He had written, co-written books and articles related to Therapeutic Garden design, including the Design Guidelines for Therapeutic Gardens in Singapore, and has designed and built various therapeutic gardens in public parks, schools and senior care facilities. Xin Kai holds a certificate in Horticultural Therapy from the University of Florida. To bring the profession of Horticultural Therapy into Singapore, Xin Kai is one of the pioneer Singaporean that is pursuing a professional Horticultural Therapy accreditation from the American Horticultural Therapy Association. He spent this professional journey working at the University of Florida Wilmot Botanical Gardens and the New York University Langone Health.

TING YU NG is the Senior Landscape Architect of the Design Division at the National Parks Board, Singapore. With over seven years of experience in landscape architecture and multidisciplinary design collaboration, she has been instrumental in a diverse range of projects, including parks, gardens, infrastructure, and urban master planning. Notably, her recent focus on Therapeutic design and Microforest has brought a unique perspective to her work. She has played a key role in significant projects such as the Yishun Pond Park Therapeutic Garden and Taman Jurong Microforest. With a degree in Landscape Architecture from The University of Western Australia, her design approach emphasises sustainable landscaping and enhancing people-nature interactions, reflecting her commitment to creating visually appealing and beneficial spaces for the community's well-being.

THEOFRASTOS MANTADELIS, Ph.D., is a Computer Scientist and researcher in the field of Artificial Intelligence since 2008. He is a Scientific Board Member and the Lead Researcher of A.I. for Mentally Healthy Cities at NeuroLandscape. He has worked for the Katholieke Universiteit of Leuven, University of Porto, University of Perugia and the Open University of Cyprus. He has been involved in several European projects and has published over 30 articles in international journals and conferences. He has researched and developed Artificial Intelligence systems with applications in agriculture, medicine and landscape architecture.

TORU TERADA is an Associate Professor and the head of the Landscape and Urban Planning Laboratory at the Graduate School of Frontier Sciences, University of Tokyo. He received his bachelor's and master's degrees from the College of Policy and Planning Sciences, University of Tsukuba. In 2011, he received his doctor's degree in Environmental Studies from University of Tokyo, and then started his academic career as a postdoctoral researcher at UTokyo. After stints as Assistant Professor (2011 to 2015) and Lecture (2016 to 2019), he was appointed to the current position in 2020. He believes that one of the specialties of the landscape field is its interdisciplinarity, and he carries out research that cuts across the fields of cities, forests, and agriculture. Regarding landscape education, he currently leads UTokyo's Integrated Environmental Design Program (IEDP), which is comprised of architects, landscape architects, and urban design experts.

YUN HYE HWANG is an accredited landscape architect and Associate Professor in department of Architecture, NUS. Her research, teaching, and professional activities speculate on emerging demands in fast-growing Asian cities by exploring ecological design and management versus manicured greenery and the multifunctional role of everyday landscapes. She focuses on transferring knowledge of urban ecology from academia to practice through active interdisciplinary and transdisciplinary collaborations.

YU MORISHITA is a researcher of architecture informatics at the Institute of Industrial Science, The University of Tokyo. Currently, a Project Associate Professor, leading Memu Earth Lab in Hokkaido, a university-wide multi-disciplinary project exploring ways of rereading the bundles of potentialities that unique local places hold and building new relationships to rewrite existing societal frameworks for the next generation. Morishita studied architecture at the Rhode Island School of Design, then history and theory of architecture at the Graduate School of Design at Harvard University. He holds a PhD in Interdisciplinary Information Studies from The University of Tokyo.

A Reflection on the Evolution of Nature-Based Allied Health Practice

text by
Amy Wagenfeld

“

What differentiates inside and outside therapy is that outdoor environments present challenges and are the ‘real world’, an integral part of a therapeutic rehabilitation process.

To some of us, the COVID-19 pandemic seems like a distant memory, but it was only four years ago when we were confronted with the unknown and mysterious virus. It was a confusing and scary time for many, including me. One constant that kept me afloat was being outside - walking, hiking, working, reading, picnicking, and gardening. Some days it felt too frightening to leave the condominium, venture down the stairs and through the lobby to go outside, but I knew that for the sake of my physical and mental health and well-being I had to do it. Masked up, I persevered. Never did my decision to confront my fears and to give myself the time and space I needed to inch my way outside disappoint me. No matter how I was feeling, going for a walk left me feeling restored and more hopeful. Living in South Florida at the time, never had I seen the range of birds, reptiles, and other animals, which were out and about

before or since the pandemic. The world was still, and these elusive creatures felt safe to venture out. I took from their strength and fortitude and joined them in quiet harmony. I greeted each creature with a sense of reverence and began to think about how my positive experiences of connections with nature and being outdoors for my personal and professional benefit could inspire others. With an invitation from a publisher, I set off to co-write and publish, with my occupational therapist colleague Shannon Marder, a book that would connect the pieces of my training as an occupational therapist with my love of nature to encourage other therapists from the healthcare and mental health professions to embrace providing therapy outside. Upon reflection I recognize that the pandemic inspired this book and I wonder if I would have written it had we not experienced COVID-19.

Nature + Therapy

To provide some context to a seemingly disparate relationship between therapy and outdoor environments, I invite you to think about why nature + therapy is in fact, a winning combination. Let’s take it a step further. What if outdoor environments were reconceptualized and reimagined as alternative spaces in which to provide health care services? This reconceptualization provides a unique opening for landscape designers to collaborate with therapists to create outdoor environments that support therapy services.

Maybe you are wondering, why provide therapy outside when the indoors offers a controlled and predictable environment for clients to learn new skills or relearn those they have lost? For some people, receiving traditional indoor therapy services may work well, with a caveat, which I will get to in a moment. What differentiates inside and outside therapy is that outdoor environments present challenges and are the ‘real world’, all too often overlooked in therapy programs. Despite attempts to be well maintained and cared for, ‘real’ outdoor environments; parks, city plazas, and playgrounds, to name a few are not always 1) safe, 2) predictable, and 3) controlled. Sidewalks may have cracks and fissures, pavements may be heaved, park trails may not be well groomed, and play elements may be in disrepair. This is the real world and oftentimes, an integral part of a therapeutic

rehabilitation process is being able to reintegrate into one’s community. It is not the same experience to learn to walk again after having an illness or injury on a smooth linoleum clinic floor, although it is a good place to start. Learning to adjust to differing light conditions cannot happen as effectively inside as outside. Inviting children with sensory integration challenges to explore various natural materials such as pinecones, stones, shells, and leaves placed in a bin in the clinic is lovely but all that is much better when it can happen outside. Talk therapy may flow more easily when walking in tandem and talking in a quiet park or on nature trails. Learning outside improves attentional focus and standardized test scores (Kuo et al, 2018; Otte et al, 2019; Schutte et al., 2017). And for many, regardless of injury, illness, or other challenges, time spent in nature is inspirational, comforting, and restorative (Meidenbauer et al., 2020; Ulrich et al., 1991). At pivotal and charged times when we need help to recover physically, mentally, and to learn better, nature can and does serve us well. I invite you to consider that therapy outside is a power boost for the body and mind. Here is the caveat - if therapy outside is not feasible, bringing nature inside, through strategies like potted plants, cut flowers, small water features, nature images, and natural light is also health promoting (Mcsweeney et al., 2014; Yeo et al., 2020). In essence, nature can and does play an important therapeutic role in improving quality of life and health and well-being when we need it most. Think of this as nature-based therapy.

Experiencing therapy outside can include a balance challenge in the ‘real world.’ (Image credit: Jessica Kingsley Publishers)



What is Nature-Based Therapy

Nature-based therapy, a broad term encompassing all therapeutic practices that involves interaction with nature, recognizes the intrinsic connection between human well-being and the natural world. It integrates outdoor experiences, interactions with nature, and environmental awareness into the therapeutic process. The fundamental idea behind nature-based therapy is that spending time in outdoor settings can elicit a profoundly positive impact on a person’s mental, emotional, and physical health. A few examples of nature-based therapy include:

Therapy activities outdoors

This form of nature-based therapy can reference the location of therapy, meaning that traditional therapy such as strengthening exercises, relearning to speak, or engaging in activities of daily living happens outside.

Ecotherapy Walks

These are therapist-guided walks or hikes in natural settings where individuals can immerse themselves in the sights, sounds, and sensations of nature.

Outdoor Group Activities

Group therapy sessions, when conducted in outdoor environments, can foster a deeper sense of community and connection among participants.

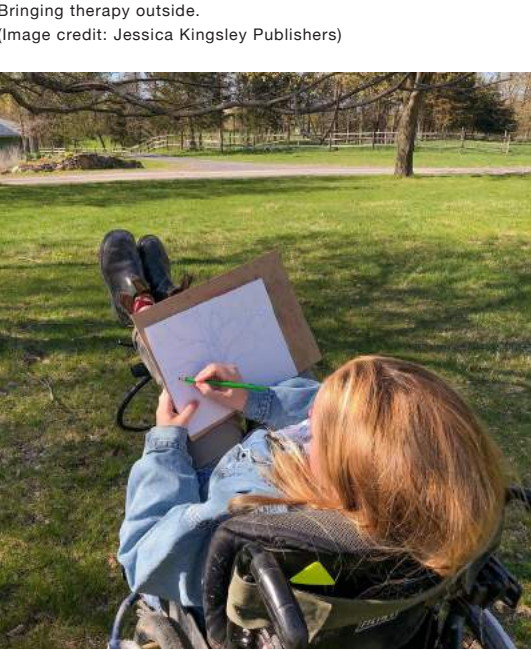
Wilderness Therapy

Longer outdoor expeditions, often involving camping or backpacking, that challenge individuals physically and emotionally, promoting personal growth and resilience are the essence of wilderness therapy.

“Nature-based therapy integrates outdoor experiences, interactions with nature, and environmental awareness into the therapeutic process.



Physical therapy outside can include strength training in the park. (Image credit: Jessica Kingsley Publishers)



Bringing therapy outside. (Image credit: Jessica Kingsley Publishers)



Gardening as a therapeutic intervention. (Image credit: Jessica Kingsley Publishers)



Therapist guided social hiking supports physical and mental health. (Image credit: Jessica Kingsley Publishers)

Therapeutic Horticulture

This sort of nature-based therapy involves engaging in gardening and plant-related activities to promote relaxation, stress reduction, and a sense of accomplishment.

Animal-Assisted Therapy

Interacting with animals in natural settings, such as equine therapy or tending care farm animals, to build trust, empathy, and emotional regulation are the foundation of animal-assisted therapy.

Using nature-based materials

When therapists determine that doing outside is not possible, there are benefits to bringing natural materials inside.

Getting close to a window

Like using nature-based materials indoors when going outside is not possible, there are benefits to viewing nature.

What Makes Nature-Based Therapy Necessary?

Nature-based therapy, facilitated by licensed practitioners offers a wide range of benefits for individuals seeking healing and personal growth.

Some of the evidence-based findings include:

Stress Reduction

Spending time in nature has been shown to lower cortisol levels, reducing stress and anxiety (Javelle et al., 2021).

Improved Mental Health

Nature-based therapy can alleviate symptoms of depression, boost mood, and enhance overall mental well-being (Preuß et al., 2021).

Enhanced Physical Health

Outdoor activities promote physical fitness, lower blood pressure, and increase cardiovascular health (Araújo et al., 2019; Astell-Burt et al, 2014).

Increased Resilience

Facing challenges in natural environments fosters resilience, self-confidence, and problem-solving skills (Han et al., 2017; Sia et al., 2022).

Emotional Regulation

Nature provides a calming and grounding environment that supports emotional regulation and self-reflection (Wicks et al., 2022).

Greater Mindfulness

Nature can encourage mindfulness, helping individuals become more present and attentive to their inner thoughts and feelings (Berman et al., 2008).

While the COVID 19 pandemic may have been the catalyst to write the book, my personal love of being outdoors and a firm belief of its restorative qualities remains my inspiration to continue to connect with nature and health and advocate for commencing therapy outside and to work alongside landscape designers to create outdoor spaces that enable therapy outside to flourish and enrich the lives of those receiving services and those providing it. Why? Because we ALL need and deserve the opportunity to connect with nature. Our lives depend on it.

About the Book

Nature-Based Allied Health: Creative and Evidence-Based Strategies was published in October 2023 by Jessica Kingsley Publishers. It is available at <https://us.jkp.com/products/naturebased-allied-health-practice>), as well as through all online booksellers and as an eBook, and at bookshops (ISBN 9781805010081).

Nature-Based Allied Health Practice begins with a chapter discussing important ethical considerations such as ensuring client privacy and safety that are associated with providing therapy outdoors. The following chapter reviews the seminal and current evidence-based research that supports the global benefits of being outdoors and the theories that align with nature and health. The evidence, from both self-reported measures and physiological biomarkers continue to be published at an astonishing rate and much of it confirms the value of nature to allow us to be at our best in body, mind, and spirit. The chapter continues by addressing inequities in practice; providing clients with humble, self-reflective, evidence-based, and client-centered care can be a small step toward righting the inequalities that affect healthcare and education systems throughout the world.

The remainder of the book is organized in a developmental, life-span fashion, beginning with chapters on children, youth, and families followed by adolescence, young adulthood, adulthood, and older adulthood. There is a focus on the developmental tasks associated with each age range and evidence that supports connections with being outdoors, in nature. A concluding chapter provides resources and suggested ways to measure nature-based therapy program outcomes.

This book also includes several other unique features:

- 1. A series of *Case Narratives*, exemplar models of more than 35 current therapy programs offered outside and the research that supports these programs. The narratives are included in most chapters according to the population that they serve. Each case narrative is accompanied with photographs.
- 2. *Nuggets of Nature*, information linking the positive benefits of nature to health, are included in all chapters. *Nuggets of Nature* are intended to inspire and empower therapists to take their practice outside. The Nuggets of Nature in the developmental age range chapters also include therapeutic nature-based activities and practical suggestions that with adaptation, can be applicable to multiple age groups.

3. A series of *This Much I Know* testaments are woven into the chapters. These are personal comments and reflections from children, adolescents, young adults, adults, and older adults who are sharing their thoughts about being outside for therapy or simply for the joys of experiencing nature and how it is meaningful and purposeful for them. Noteworthy is that children drew pictures and share a brief explanation of their favorite ways to be in nature. The comments and drawings shared in the developmental age range chapters correspond with individuals in that age group.

4. An appendix that provides two practical *Readiness Checklists* for two types of outdoor therapy program models. This feature is designed to help plan, organize, and facilitate the process and ease the transition from indoor to outdoor therapy.

(Excerpted from *Nature-Based Allied Health: Creative and Evidence-Based Strategies* with permission from Jessica Kingsley Publishers).

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text by
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Horticultural therapy and therapeutic horticulture use plants and plant-based activities to facilitate the well-being of individuals or groups.

Introduction

The therapeutic horticulture movement debuted in Singapore in 2016, with the launch of the Therapeutic Garden at HortPark. Since then, there has been growing efforts in providing opportunities for more people to benefit from therapeutic horticultural activities. As the movement gains traction, there is a need to equip local “nature and health” practitioners with the professional skill set of a Horticultural Therapist and to promote the benefits of horticultural therapy and therapeutic horticulture to a range of population groups, including those in the healthcare, education, landscape and social service sectors. This article covers an introduction of the practice of therapeutic horticulture, and its industry development in Singapore, including various related initiatives led by individuals and organisations.

Horticultural Therapy and Therapeutic Horticulture: Definition and Development

According to the American Horticultural Therapy Association (AHTA), horticultural therapy (HT) is the active use of plants or plant-based activities designed with established goals and objectives, to facilitate the treatment, rehabilitation or vocational training of individuals or groups. Similarly, therapeutic horticulture (TH) also uses plants and plant-based activities to facilitate the well-being of individuals or groups but does not require documentation of the process and outcomes.¹ The activities and the programs can be active or passive, and may be conducted by a registered horticultural therapist or other trained professionals. A horticultural therapist can work with a physiotherapist to treat a post stroke patient by conducting some of the therapy sessions in a therapeutic garden, such as assisted walk or

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The Certificate in Therapeutic Horticulture serves as a condensed yet comprehensive introductory course for individuals in Singapore who are interested to utilise TH as part of their work, such as healthcare and social care professionals, programme coordinators, horticulture and landscape professionals.

simple activities like pot painting, plant propagation to train various skills, including fine and gross motor skills. The therapists conduct the sessions with specific goals and objectives, and the results will be clinically documented. Conversely, TH can be facilitated by a non-certified HT professional in a non-clinical setting. Overall goals can still be set for the clients, but they will not be specific to a client’s particular condition.

Globally, the adoption of using horticulture for therapeutic purposes is still relatively low. Places with HT associations offering professional registrations are found in the United States, Canada, Hong Kong and Taiwan. Others like Australia, Japan, South Korea, China, India, Peru and parts of Europe have related institutes that offer training and knowledge sharing.² In the case of Singapore, while there isn’t any set-up equivalent to the AHTA that officially governs the professionalism and registration of the HT practice, the National Parks Board (NParks) has been spearheading initiatives to promote the benefits of TH. In 2015, the agency launched a plan to develop a network of therapeutic gardens across various parks in Singapore. The initiative was regarded part of the 2015 Action Plan for Successful Ageing report (Ministry of Health, 2015), in response to growing concerns on rapid ageing population and increase in dementia cases in Singapore. Since, NParks has developed several related initiatives to promote the use of TH in healthcare settings and educational institutes.

Capacity Building

During the early years of the TH movement in Singapore, NParks has engaged Ms. Elizabeth RM Diehl, an AHTA registered horticultural therapist and Director of Therapeutic Horticulture at the Wilmot Botanical Gardens (University of Florida) to co-plan the curriculum and train local practitioners to conduct TH activities and advance knowledge among allied professionals. Back at the University of Florida, Elizabeth leads the Undergraduate Certificate in Horticultural Therapy, a professional programme that bridges the gap between knowledge and practice. The programme has attracted enrolment from students internationally, including Singapore, some of whom are the pioneer practitioners of TH locally.

In 2016, NParks’ Centre for Urban Greenery and Ecology (CUGE) offered the first Certificate in Therapeutic Horticulture, along with other related short courses. Subsequently, the course was handed over to the Ngee Ann Polytechnic (NP), under its Continuing Education and Training Academy. The course serves as a condensed yet comprehensive introductory course for individuals interested to utilise TH as part of their work, such as healthcare and social care professionals, programme coordinators, horticulture and landscape professionals. It covers topics like plant selection, maintenance, and pest & disease management, therapeutic garden design, aspects of working with individuals with Autism Spectrum Disorder (ASD), stroke, dementia, mental illness, as well as activity planning and documentation processes.³

Therapeutic Horticulture Programmes
in Public Parks

NParks followed on to introduce its first nation-wide TH programming initiative to organize facilitated sessions at the therapeutic gardens of public parks. To date, many beneficiaries from various care facilities, including seniors, persons with dementia and others with special needs, have participated in the programme. A typical TH session would comprise simple warm-up exercises that lead to a curated walk through the therapeutic garden where the sensorial aspects of the flora and fauna are highlighted. This is followed by either a horticultural or plant-based arts & craft activity in the activity area of the therapeutic garden, usually with a sheltered space. The activities aim to promote low intensity exercise, improve motor skills, stimulate memory and promote mindfulness, and allow positive interactions in Nature. Some programmes also encourage intergeneration interactions between seniors and children. This aims to promote positive conversations and activities among them, and reduce social isolation in seniors.

Employing Therapeutic Horticulture
at Senior Care and Healthcare Facilities

It is known that incorporating greenery into healthcare settings have numerous positive effects on patients, visitors, and healthcare staff. TH has also been widely accepted as a valuable and versatile tool for rehabilitation and skill development when integrated into occupational therapy.⁴ It can also be seen as a form of social prescription, playing a vital role in preventive healthcare. Using plant-based interventions like TH allows for both social and environmental elements into one’s physical and emotional well-being. In particular, there has been numerous research done to understand its effects on seniors, including those with dementia. For example, a systematic review in 2019 concluded that TH benefits patients with dementia by alleviating the degrees of agitated behaviours, and increasing time of engaging in purposeful activities which in turn reduces time of doing nothing.⁵ Locally, several scientific papers published has also provided the evidence that the nature-based intervention has the potential to be translated to programs to benefit seniors in the tropics.⁶

Case Studies on Industry-led Therapeutic
Horticulture Practices in Singapore

Senior Care

Lace Ong is one of the pioneer graduates of the NParks’ CUGE Certificate in Therapeutic Horticulture program. She works with participants including seniors, those with dementia, stroke recovery, and other terminally ill patients at the HCA Hospice. Her TH sessions include activities related to gardening, plant-based arts and craft, as well as flower arrangements, where they can be facilitated with positive emotive outcomes. Lace finds her work at HCA Hospice very meaningful, as she gets to teach new skills and share stories with her clients. Helping her clients cope in the last stage of their life has a powerful impact on her.

Another individual, Edmund Gan, employs knowledge of urban agriculture to help clients in hospital settings. Edmund is the founder of Sogen, where he conducts training on urban agriculture to impart agronomic principles, good agricultural practice skills, and awareness on food source and nutrition. Through the engagement at St. Luke’s Hospital and Eldercare, he works with seniors with dementia and patients on rehabilitation. One benefit of employing TH in rehabilitation is its adaptability – the activities can be modified to suit the specific needs of individuals. For example, the activity of watering plants with pressurised sprayer benefits stroke patients with physical limitations, while the mud ball squeeze test is used for patients with poor hand dexterity and to help them learn about determining soil texture.



Fig 3.
Lace Ong conducting
a therapeutic horticulture
session at a senior care facility
(Image credit: Lace Ong)



Fig 4.
Edmund Gan conducting a
workshop on growing edibles
(Image credit: Pearlina Sim)

Fig 1.
The author, Tham Xin Kai, founder of Hortherapeutics, conducting a therapeutic horticulture session
at the Therapeutic Garden @ Bedok Reservoir Park (Image credit: Pearlina Sim)



Fig 2.
A pressed flower frame making activity, part of the NParks
Therapeutic Horticulture Programme at the Therapeutic Garden
@ HortPark (Image credit: Oh Ahrum)



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Using plant-based interventions like therapeutic horticulture allows for both social and environmental elements into one’s physical and emotional well-being.

Empowering Children

Both HT and TH can benefit children by promoting physical activity, sensory stimulation, and improved mental well-being.⁷ For children with special needs, it can provide a structured and calming environment, enhancing their cognitive and emotional growth. When incorporating sensory plants into therapy, it is essential to consider the specific needs and preferences of the individuals involved. In this area, Edmund works with children and adolescents in schools, including those that serve children with special needs, such as mild to moderate ASD, Intellectual Disability, and Down Syndrome. Through his experience working with clients with cognitive limitations, Edmund emphasises hands-on activities, focusing on the sense of taste, smell, sight and touch. Examples of his activities are differentiating edible plants with Stevia (sweet) and Cranberry Hibiscus (sour), or comparing different scents from Rosemary, Lavender or Basil.

HT can also be used as a modality for vocational training, especially for children with special needs. Fion Tham, an Urban Farmer, certified in both Social & Therapeutic Horticulture, under Thrive, UK, and in the local Certificate in Therapeutic Horticulture, conducts vocational training for students with special needs. The training equips the beneficiaries with the skillset to work in the horticultural industry. A trained Mental Wellness Befriender, Fion also runs therapeutic sessions in forest trails and therapeutic gardens to cultivate interest and connect her participants with nature.

Another individual is Lee Mei Kheng. In 2023, she founded The Dreams Gardener as a platform to share her knowledge on growing edibles and plant-crafts with people, including people with special needs, to live an active and purposeful lifestyle through plant-based activities. Aside from pursuing the Certification in Horticultural Therapy from the University of Florida, she is currently building a greenhouse for plant-crafts making and on-demand horticultural services, to empower persons with special needs the ability and resources to live purposefully by growing edibles, or earning an income through plant-craft making.

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When incorporating sensory plants into therapy, it is essential to consider the specific needs and preferences of the individuals involved.



Fig 5.
Fion Tham conducting a walk in the therapeutic garden at Jurong Lake Gardens (Image credit: Tham Xin Kai)



Fig 6.
Lee Mei Kheng conducting a plant-craft workshop with a participant (Image credit: Lee Mei Kheng)

Addressing the Therapeutic Needs of Individuals
Recovering from Trauma due to Substance Abuse

The incorporation of TH into programmes serving seniors and children with special needs have generally gained acceptance locally. Its benefits on other population groups have also been explored. One such area is mental rehabilitation for conditions such as trauma due to substance abuses. Some research has shown the benefits of using HT/TH in the rehabilitation of addiction and trauma. Research conducted at the Florida Alcoholism Treatment Centre showed that HT activities such as planting, pruning, weeding allow for those recovering from addictions to experience physical sensations, hence increasing one’s sense of effectiveness.⁸

Locally, Hortherapeutics, in collaboration with The Greenhouse Community Services Ltd, conducts the Micron Greenhouse Therapeutic Horticulture Programme for substance addiction recovery, benefitting marginalised communities. The Greenhouse adopted the bio-psychosocial-spiritual model of addiction, which considers the multitude of human conditions influenced by biological, psychological, social factors, as well as spiritual aspects of beliefs, values in its community.⁹ TH can help the beneficiaries understand the dimensions of their life that need to be tended to in order for them to heal and grow.

Understanding the multitude of internal and external conditions affecting substance addiction is crucial to creating a recovery roadmap for the group. The 8-month programme composed of three runs of six sessions for counsellors, peer supporters, and the main participants. At the start and end of each run, participants were instructed to fill up the Short Warwick Edinburgh Mental Well-being Scale (SWEMWBS) survey.¹⁰ During the sessions, participants explored themes of hope, purposes and identity, through gardening and nature-based art activities, including rare plant propagation, seed mandala and terrarium making. For example, growing plants in the self-contained environment of a terrarium can be used as a metaphor for self-care and self-worth. When plants undergo stress because of changes in growing conditions, they may adapt to changes in order to survive. This emphasis on self-resilience can be rediscovered by the participants themselves through doing the activities. The results of the post-session SWEMWBS survey, weekly observations, and an End of Programme survey, showed positive outcomes in the participants - learning new skills and insights from each session have been incorporated into their own healing journey. Some of them continued as peer supporters to help run future programmes at The Greenhouse.



Fig 7.
Participants for The Micron Greenhouse Therapeutic Horticulture Programme engaging in a pressed flower bookmark-making activity (Image credit: Tham Xin Kai)



Fig 8.
Ganesh Kumar giving a public tour at the Woodlands Botanical Garden, located in Woodlands Town Park East (Image credit: Ganesh Kumar)

One way to raise awareness of the benefits of TH to the public is through community-based initiatives. The Woodlands Botanical Garden (WBG), supported by NParks and located within Woodlands Town Park East is one such initiative. Efforts of the garden is led by Ganesh Kumar, a chemist by profession who now focuses his time on horticultural works and educating the public on biophilic engagements through various initiatives. The garden is a place where Ganesh and his team of volunteers works with partner groups to improve biodiversity in gardens and restore habitat of various flora and fauna, as well as facilitate sessions for participants to improve on their mental well-being.

One of their programmes involves working in collaboration with Human-Animal Bond In Ministry, a social enterprise that runs regular animal assisted intervention sessions at the garden. The sessions encourage plant-people-animal interaction to groups like seniors, children from foster homes and those with special needs, as well as ex-convicts. This programme, including other similar ones conducted, also allows residents and members of the public to come together for various events.

Conclusion

Through NParks’ research and TH-related initiatives, the practice of TH emotive outcome is gaining traction in Singapore. TH has now been incorporated in several senior care institutions, healthcare settings and schools. Last, at the community-level, therapeutic gardens and places like WBG function as venues where TH and other nature-based activities can be conducted, raising awareness about using plants and plant-based activities to improve health and well-being.

The community of TH practitioners is slowly growing in numbers, as more individuals are pursuing professional education in HT, locally or abroad. It is well established that HT and TH facilitate the improvement in health and well-being. Their seamless integration into healthcare and social settings promises continued growth. As a society recognizes nature’s healing potential, the practice stands ready to play a pivotal role in enhancing individual lives and communities.

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FOOTNOTES

- ¹ AHTA Office. “AHTA Definitions and Positions.” American Horticultural Therapy Association. Accessed January 4, 2024. <https://www.ahta.org/ahta-definitions-and-positions>.
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- ⁹ Vermette, David, and Benjamin Doolittle. “What Educators Can Learn from the Biopsychosocial-Spiritual Model of Patient Care: Time for Holistic Medical Education.” *Journal of General Internal Medicine* 37, no. 8 (2022), 2062-2066. doi:10.1007/s11606-022-07491-8.
- ¹⁰ “Short Warwick-Edinburgh Mental Well-being Scale (SWEMWBS).” CORC Child Outcomes Research Consortium. Accessed January 5, 2024. <https://www.corc.uk.net/outcome-experience-measures/short-warwick-edinburgh-mental-well-being-scale-swemwbs/>.

Cultivating The Vision: Advancing Biophilic Design through Innovative Education

text and images by
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Urban living, influenced by factors like building densification, climate change, and the increasing loss of green spaces, can significantly deteriorate the quality of living, societal dynamics and physical health.

Urban living, influenced by factors like building densification, climate change, and the increasing loss of green spaces, can significantly deteriorate the quality of living, societal dynamics and physical health. It underscores the crucial significance of both exposure and the diverse range of green spaces in mitigating various urban living challenges (Urbact 2022; Olszewska-Guizzo et al. 2022; Peen et al. 2010). The expanding body of scientific studies reinforces the idea that exposure to nature in urban settings significantly enhances mental health, reduces stress, boosts productivity, and contributes to an overall improvement in quality of life (Beute et al. 2023).

Lei et al. (2021) discovered the positive impact of the presence of greenery on physiological brain activities. Additionally, in a Singapore study, Olszewska-Guizzo et al. (2022) found that therapeutic gardens with certain contemplative features can support the treatment of depressive disorders, the most common mental illness worldwide. Similar stress-reducing benefits associated with the presence of plants and natural views were emphasised in research on salutogenic workplace settings (Bergefurt, Appel-Meulenbroek, and Arentze, 2023) (Fig.1). In this context, the philosophy of biophilic design becomes especially relevant by recognising and embracing the inherent human connection to nature. It advocates for designers to intentionally integrate natural elements into the built environment, strategically reconnecting people with the natural environment.

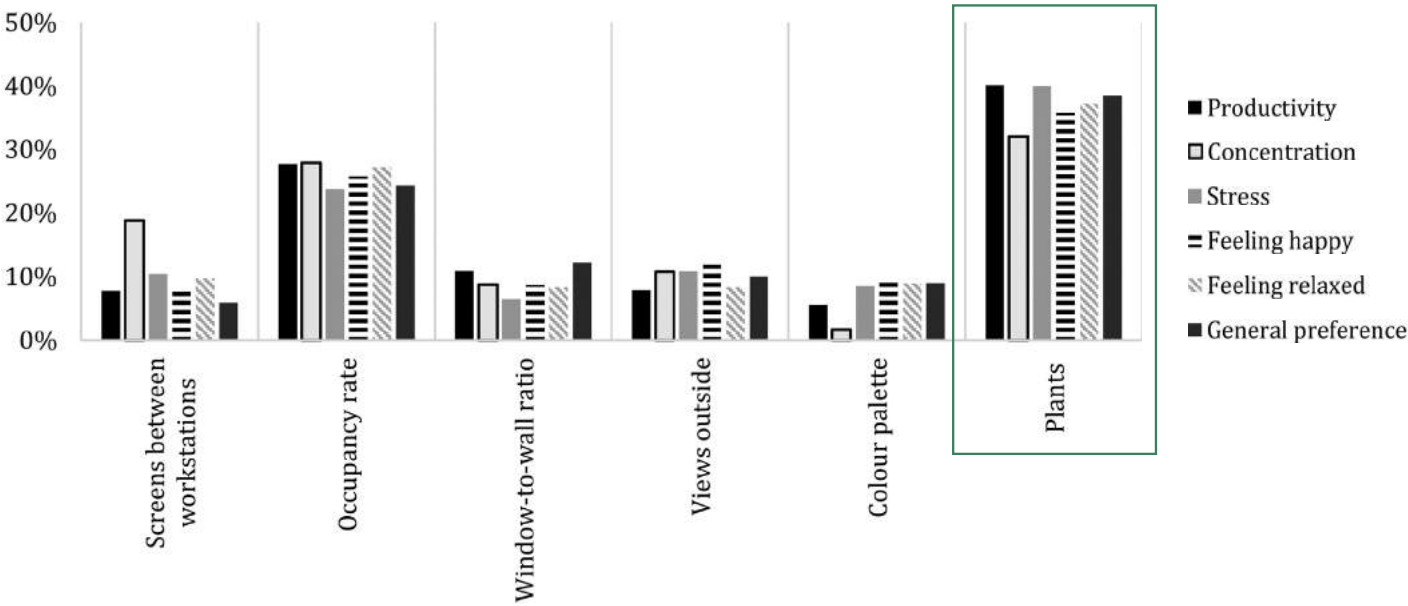


Fig 1.
Relative importance of workspace attributes per psychological or cognitive response.
(Source: Bergefurt, L., R. Appel-Meulenbroek, and T. Arentze, 2023.)

New research supports the measurable, positive impacts of biophilic design on human health, strengthening the empirical evidence for the human-nature connection and raising its priority level within both design research and design practice (Downton et al. 2017). Despite advancements in comprehending these effects, it is evident that practitioners still encounter challenges in translating research findings into practical applications, hindering the broader advancement and diverse application of biophilic design.

Hence, Nanyang Academy of Fine Arts (NAFA), one of the founding members of the University of the Arts Singapore (UAS), recognised the pivotal role of education in advancing professional training in biophilic design, amplifying the synergy between research and practical application.

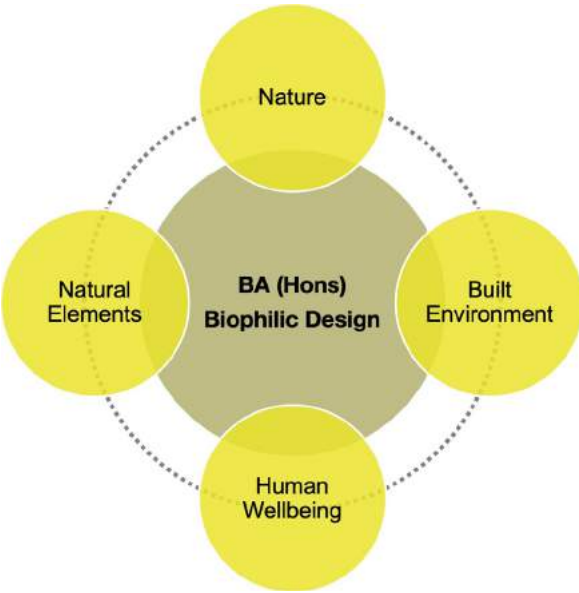


Fig 2.
Curriculum Focus

“The exploration extends to urban ecology and regenerative design, highlighting the symbiotic relationship between the built and natural environment.

The program places a strong emphasis on evidence-based and nature-centric solutions, promoting collaborative approaches through interdisciplinary practices that transcend singular disciplinary perspectives.

The subsequent sections delve into current biophilic design practices, the neuroscience dimension in biophilic design, the intersection of design with health and well-being, and the importance of interdisciplinary collaboration. The exploration extends to urban ecology and regenerative design, highlighting the symbiotic relationship between the built and natural environment. These discussions are instrumental in shaping the curriculum structure and guiding the integration of knowledge and practice necessary to advance a holistic approach to biophilic design.

Current Biophilic Design Practice

The original concept of biophilic design, an emerging field pioneered by Yale social ecologist Stephen R. Kellert, promotes improved health and well-being by creating connections between people and nature in the built environment. This field has been broadly categorised into different nature-inspired disciplines, encompassing Nature-based solutions like Bio-utility, Natural Forms exemplified by Bio-morphism, and Nature’s Technology, represented by Biomimicry. However, a more precise definition posits that Biophilic design essentially serves as a branch devoted to addressing Bio-Psychology wellness (Jain et al. 2023).

Many Architectural, Urban Planning, Landscape, and even Interior Design practices claim to have incorporated Biophilic Design into their proposals. Some use the ‘14 Pattern of Biophilic Design’ by Terrapin Bright Green LLC (Browning, Ryan, and Clancy 2014), Kellert’s ‘24 Biophilic Design Strategies’ (Kellert et al. 2015) and others use various features and qualities of their own derivation. The current approach to biophilic design lacks organisation and scientific rigour, making it subjective and complex. This makes it challenging to standardise the evaluation of achievable levels of wellness.

In acknowledgement of these challenges, the degree programme addresses the necessity for a robust foundation in understanding how the design of physical spaces influences human cognitive functions, emotions, and overall well-being. This involves advancing the operational framework and scientific precision essential to the field of biophilic design, transcending theoretical discussions to actively engage in systematic analysis of user feedback data. Through this dual focus on foundational understanding and empirical analysis, the programme aims to enhance the scientific rigour and effectiveness of biophilic design practices.

Neuroscience Dimension in Biophilic Design

Typically, when distant disciplines come together, there are certain challenges and barriers to overcome. In order to inform the design of the living environment with scientific findings, the areas related to human health and well-being had to be incorporated into the research and design protocols. For more than a decade, we have observed a blooming interest in science-informed design in various sectors among different stakeholders, with multiple attempts to marry the art and science in an endeavour to create healthier living environments. As an effect,

many theories and concepts are being developed and many guidelines and principles established, some are more and some less valid and grounded in science. We are living in interesting times when knowledge about the design for health is being created and new gold-standards are being established. The amount of research attempts and publications, buzz-words and theories might be puzzling, and it might be difficult to select the most valuable insights for design. This is why it is very important to provide a comprehensive educational guideline through the recent scientific developments in the area of biophilic design and to guide future designers (architects, landscape architects, urban planners and interior designers) through the nuances of scientific research. This is to allow them to critically assess the knowledge, and extract the most useful information from the ongoing buzz.

Environmental psychology is the main pillar of the biophilia hypothesis. Environmental psychologists have already been gradually applying more sophisticated and robust methods, such as cognitive and functional neuroscience to inform the design practice for some years, but the knowledge in that area has not been synthesised and taught in academic courses before. The data about people’s momentary mood, cognitive performance, sleep quality, long-term well-being among other self-reported measures have been a good source of information about the quality of environment and people’s realised needs. The physiological data from people’s brain activity, heart rate or stress levels can provide even more nuanced information about the processes that people might be unaware of in their day to day. Biophilic design education cannot come without the strong basis in the science of how environment can affect the human psyche and human brain.

Fig 3. Course Structure



“We are living in interesting times when knowledge about the design for health is being created and new gold-standards are being established.

Design for Health and Well-being

According to the United Nations Department of Economic and Social Affairs, 55% of the world’s population now lives in urban areas, and by 2050 the percentage will increase to 68% (UN DESA 2018). The increasing pressure of people living in urban cities away from rural areas continues to compromise the vital connection that people have with the natural environment and its benefits to our health. The World Health Organisation (WHO) states that health is the state of being physically, mentally, and socially well, rather than just the absence of disease or illness (“Health and Well-Being,” n.d.). Conversely, individuals and societies experience well-being as a positive state of mind (“Promoting Well-being,” 2021). Similar to health, well-being is a resource for daily life and is determined by social, economic, and environmental conditions. The concept of biophilic design can allow for a conscious effort to re-integrate nature back into our living spaces by stressing its benefits to improve health and well-being. Over the years, many research studies have been conducted to support this. One important paper is the “*View through a window may influence recovery from surgery*” by Environmental Psychologist Roger S. Ulrich in 1984. In this seminal research, he recorded findings that post operation patients whose rooms included windows that looked out to natural settings recovered faster than those without windows (Ulrich 1984).

In general, incorporating built environment with greenery serves as important spaces for people and their living environment. However, there has also been an increased demand for design interventions to cater to the needs of specific users. Here, biophilic principles can influence the design of therapeutic gardens, which are purpose-built spaces created to serve specific needs of various population groups, including seniors and children, physical or cognitive disabilities, as well as other socio-emotional conditions.

While considering the infrastructure of such spaces is important, it is also vital to examine how spaces can be utilised to promote healing. In recent years, there has been increasing use of nature-based interventions (NBI), particularly those that encourage people-plant connections to improve the well-being of people with diverse backgrounds and conditions.

NBIs, such as forest therapy and horticultural therapy, provide valuable insights into the design of biophilic experiences aimed at promoting health and well-being. These interventions involve structured activities with plants and nature to improve various aspects of an individual’s life and condition. The impact of biophilic design extends beyond physical health to also encompass well-being. Built environments influenced by biophilic design approaches foster a sense of connection to the natural world, promoting health and well-being to various users for their physical, cognitive, and emotional needs.

Urban Ecology and Regenerative Design

The World Wildlife Fund has declared an average 69% decline in abundance of wildlife populations from 1970 to 2018 (WWF 2022) and the Intergovernmental Panel on Climate Change has warned that limiting global warming to 1.5 degrees Celsius compared to pre-industrial levels may be our last chance of avoiding irreversible damages to the planet (IPCC 2018). Faced with twin emergencies, what is the practical action for a practitioner?

Regenerative design provides an approach for establishing a partnership with nature by pursuing sustainability within the framework of living, evolving systems. It works on developing the capability of social and natural living systems, to express their potential for diversity, complexity and creativity (Mang, Haggard, and Regenesi Group 2016). It aims not only to avoid negative environmental impacts but to restore and renew the environment. Like biophilic design, it can draw inspiration from natural systems, patterns and processes. However, unlike sustainable design, the emphasis is on prioritising systems which can regenerate or create positive outcomes for the environment, through a deep understanding of the interconnectedness of all things. For example, planting a food forest with an array of plant species does not only produce food for human consumption. Other benefits of a multi-culture include preventing soil erosion, creating shade to mitigate high ambient heats, fixing nitrogen, keeping soil well-aerated, providing improved air quality and providing refuge for fauna.

A slight shift in the focus from solely maximising food production to maximising long-term environmental benefits creates a holistic system which offers a lot more.

Urban ecology encompasses understanding the interactions of organisms, built structures, and the physical environment (Forman 2016). The challenges of the urban environment, such as flooding, heat stress, air pollution, loss of biodiversity habitat and connectivity can be approached by integrating ecological principles into the cities so that cities can be more liveable. The concept that the environment is dynamic and has to be performative allows us flexibility in spatial planning. At a landscape level, multi-functional water-sensitive urban design elements, multi-layered streetscape planting, skyrise greenery and urban forests provide ecosystems services such as temperature regulation, water detention, rainwater harvest and reuse while supporting urban biodiversity and giving urban dwellers opportunities for nature appreciation. On a planning level, an introduction of policies and infrastructure can support more sustainable modes of transport such as cycling reduce air pollution and reliance on fossil fuels while promoting a healthier lifestyle. On a regional level, considering nature-based solutions such as restoring mangrove forests can help to stabilise shorelines while capturing carbon.

As cities grow, biodiversity declines and environmental pressures continue to mount, building a synergetic and harmonious relationship between the built and natural environment is the only option. The most effective solutions are often those that work sensitively with nature, and this begins with biophilia.

Importance of interdisciplinary collaboration

The application of specific biophilic design strategies with targeted health and well-being outcomes is an important part of the biophilic design process that distinguishes a biophilic building from one that simply incorporates greenery or daylighting as isolated gestures. These outcomes can be translated into health or performance metrics that are already familiar to clients, such as shorter recovery periods for patients in a hospital, improved test scores in a learning environment, and increased productivity in a workplace. Defining performance in measurable terms helps to drive the design in a holistic way from an early stage, encouraging a more collaborative way of working amongst all stakeholders – which typically includes the client, end-users, multidisciplinary design team and other consultants – to achieve a common goal.

Meaningful results can be achieved if the process is organised in the form of a series of stakeholder charrettes that bring together the different user groups and design team to discuss and agree on the biophilic goals, strategies, and desired outcomes of the project. For instance, if one of the goals of an office renovation project is to improve employee engagement, a necessary first step will be to define what the baseline performance is and how the results will be evaluated quantitatively or qualitatively. From a Human Resources perspective, this may translate into lowering absenteeism or turnover rates; from an employee’s perspective, it may mean having more opportunities for a range of formal and informal interaction with his bosses and colleagues. Methods of measurement often include pre- and post-occupancy surveys, which must be planned early.

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As cities grow, biodiversity declines and environmental pressures continue to mount, building a synergetic and harmonious relationship between the built and natural environment is the only option.

Having a clear idea of the desired outcomes for the project can help in the formulation or refinement of the programmatic brief, which describes the qualities that key spaces must have and sets the framework for a collective discussion on the biophilic design attributes that may be considered in those spaces. Where the goal is to improve workplace engagement, different types of gathering spaces may be defined in the brief, along with various use scenarios. Teams may choose to focus on biophilic design strategies that resonate with them, such as creating a distinct sense of place and encouraging curiosity and exploration, which may be expressed through colour, patterns, textures, lighting, acoustics, planting, artwork and furnishings for different group sizes and settings.

Terrapin’s 14 Patterns of Biophilic Design frames biophilia as an essential component of environmental quality, along with well-established attributes such as daylighting, materials toxicity, air, water, and soil quality. This encourages design teams to develop cross-platform strategies that can address building performance, health, and well-being at the same time. Where biophilic design attributes that are conventionally seen as “aesthetic features” can be linked to building performance or a measurable health and well-being outcome, there is a greater chance that they will persist in a project. For instance, water features such as ponds and waterfalls can be conceived as part of a larger stormwater management strategy within a site, and sensitively designed to enhance biodiversity and create a cooler microclimate while promoting a sense of calmness.

“Through meticulous exploration of the symbiotic relationship between humans and nature, biophilic design emerges as a transformative force capable of fostering not only physical health but also mental well-being and societal harmony.

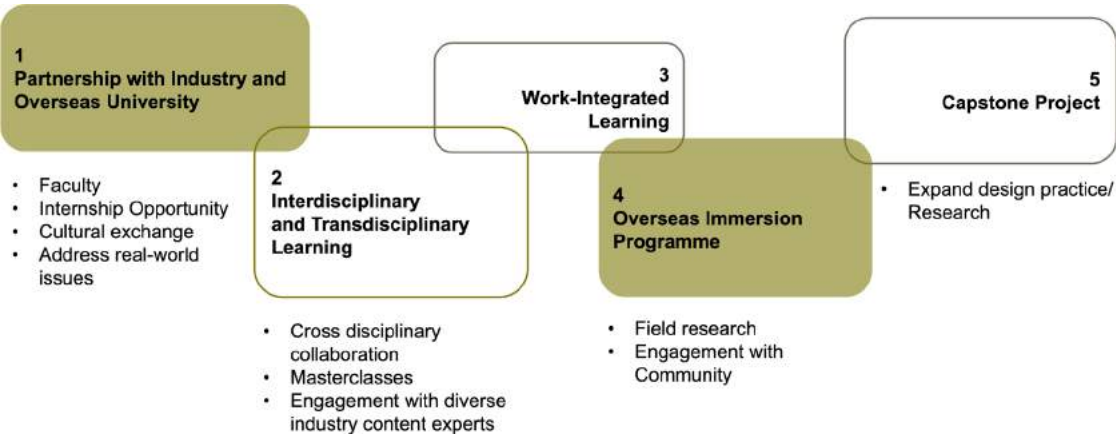
Conclusion

As we contemplate the future of our urban environments, the lessons learned from biophilic design extend beyond aesthetics. In the ever-evolving landscape of urban living, the imperative need for biophilic design becomes increasingly apparent. The focus on regenerative and evidence-based design propels us toward a harmonious coexistence with the natural world, recognising the intricate link between the health of our cities and the well-being of the ecosystems we inhabit. Through meticulous exploration of the symbiotic relationship between humans and nature, biophilic design emerges as a transformative force capable of fostering not only physical health but also mental well-being and societal harmony.

The University of the Arts Singapore (UAS) stands at the forefront of this transformative movement, leading the way in advancing the knowledge of biophilic design through innovative education. Conferred by the UAS, the new BA (Hons) Biophilic Design programme aims to cultivate designers capable of making a positive impact on shaping the built environment. The programme prioritises synthesising insights from diverse disciplines such as Architecture, Landscape Architecture, Interior Design, Urban Planning and Environmental Psychology to enhance the current practice, facilitating the collaboration between researchers and practitioners to cultivate a shared understanding of the nuanced complexities.

By seamlessly integrating research methodologies, design practice, and interdisciplinary collaboration, the UAS shapes a paradigm that not only prioritises evidence-based, nature-centric solutions but also bridges the gap between research and design practice. Through dynamic collaboration with industry and other overseas institutions, we cultivate a vibrant environment conducive to the development of cutting-edge insights and innovative practices, ensuring that our approach remains sensitive to the unique context of Southeast Asia. This effort offers solutions that nurture a healthful environment for individuals and communities, reflecting a dedication to realising the City in Nature.

Fig 4.
Distinctive Features



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Canine and Feline Welfare in Urban Environments: Innovative Research by the Centre for Animal Rehabilitation

text by
Paul Chen

images by
National Parks Board

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The Centre for Animal Rehabilitation is actively working to improve the welfare of these animals through various programmes and research initiatives.

The bustling urban landscape of Singapore is home not only to humans but also to a population of free-roaming dogs and cats. These animals, often unowned, are the focus of the Centre for Animal Rehabilitation (CAR), managed by the Animal & Veterinary Service (AVS), a cluster of the National Parks Board (NParks). CAR is actively working to improve the welfare of these animals through various programmes and research initiatives. In this article, we will explore the world of animal welfare, with a particular focus on the rehabilitation and rehoming of free-roaming dogs and cats. We will take you through some of the fascinating research conducted within CAR to better understand the adaptability and sociality of these animals in shelter conditions.

Canine Welfare: Measuring Stress and Adaptability

Singapore’s Trap-Neuter-Rehome/Release-Manage programme aims to rehome as many sterilised free-roaming dogs as possible. As most of these dogs are predisposed to fear and anxiety, especially when faced with new situations—such as suddenly being placed in a home environment—it is important that they are suitably rehabilitated before rehoming. This process often necessitates a period of sheltering. The suitability of a dog for rehoming is therefore contingent on its adaptability to shelter conditions. To accurately assess this adaptability, we collect and analyse data on the animals’ bioindicators of stress, employing scientific methods to ensure the best outcomes for these dogs.

We measured the cortisol levels in the dogs, a hormone that increases in response to stress. While serum cortisol measurements are invasive, researchers have found a non-invasive alternative: canine faecal samples. By examining faecal cortisol metabolites (FCM), we have gained valuable insights into the adaptability of Singapore’s free-roaming dogs.

In our study, we compared FCM levels between newly sheltered dogs and pet dogs. The results were intriguing. FCM levels of recently sheltered dogs were higher than those of pet dogs, indicating higher stress levels in sheltered dogs. However, unlike other studies, FCM concentrations in recently sheltered dogs continued to rise over time (1-22 days since intake), suggesting that the dogs may not have fully adapted to shelter conditions yet. Moreover, factors such as the animal’s sex and the state of faecal samples influence FCM levels.

Unexpectedly, we found dogs with a good prognosis (i.e., deemed suitable for rehabilitation) having higher FCM levels than those with a poor prognosis. While elevated cortisol levels have often been associated with higher stress and poorer animal welfare, in the short term, a rise in cortisol level is adaptive. Hence, dogs with higher FCM levels may indicate a better adaptive response than dogs with lower levels due to sheltering. This highlights the complex interplay of stress and adaptability, and thereby further emphasises the importance of a holistic understanding of canine welfare in shelter environments.

These results demonstrate that FCM not only provides a reliable bioindicator of stress but is also a valuable tool for evaluating dogs’ adaptability to shelter conditions. Our research sheds light on the challenges these animals face and the need for tailored rehabilitation programmes.

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These results demonstrate that faecal cortisol metabolites (FCM) not only provides a reliable bioindicator of stress but is also a valuable tool for evaluating dogs’ adaptability to shelter conditions.



Dog in kennel

Feline Welfare: Assessing Sociality and the Promise of Automation

Rehoming sheltered cats pose a unique challenge, particularly when their socialisation history is unknown. Only cats that are socialised towards humans can be rehomed without serious compromise to their future welfare. Conventionally, assessing their sociality towards humans has been a time-consuming process, involving five interactive assays and one observational assessment. Therefore, we are exploring innovative ways to streamline this assessment and, in the future, potentially automate it.

The pilot project involves a criterion-based assessment, which offers a quicker alternative to traditional methods. We also explored the possibility of an automated assessment—potentially using computer vision—through monitoring in-cage behaviours, reducing the need for human observation.

The results are promising. Cats that met the assessment criterion displayed distinct behaviours (i.e., either touching the hand of the assessor or rubbing on the cage door) during the evaluation. Similarly, cats behaved differently in their cages depending on whether they were previously more or less socialised towards humans. This hints at the possibility of automating their sociality assessment just by monitoring their in-cage behaviours.



A free-roaming cat in our shelter

The implications of these findings are substantial. The criterion-based assessment not only saves time but could also lead to more efficient rehoming processes. Moreover, the potential for automating sociality assessments through artificial intelligence presents a tantalising prospect for the future.

While these findings require further validation and consideration of shelter stress, they represent significant progress in enhancing feline welfare in urban environments. Such research will continue to inform our animal care decisions, ultimately with the goal of improving animal welfare in shelters and in homes.

Toward a More Compassionate Urban Landscape

Through research and innovative programmes, CAR endeavours to optimise the opportunity for every dog and cat to find a loving home.

As our urban landscape evolves, we must not forget our responsibility toward the animals that share our cities. The work we do in CAR strives to create a more compassionate and understanding urban environment for our furry companions. The path to a better future for free-roaming dogs and cats in Singapore is paved with research, compassion, and innovation. We hope that this knowledge will inspire others to join us in this worthy cause and to bridge the gap between the human and animal inhabitants of our cities.

“The path to a better future for free-roaming dogs and cats in Singapore is paved with research, compassion, and innovation.”



The Centre for Animal Rehabilitation.
(Image credit: Brina Chan)

Urban farming: What is the potential for adoption in Singapore?

text and images by
Magda Rich

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Almost all participating residents expressed an interest in horticulture, ranging from a curiosity to try a new activity, to eagerness in starting as soon as possible.

Overview

Last year, I completed my PhD thesis on the adoption and integration of care farming principles for older people in dense cities. A large part of my project was based on an extensive case study in Singapore. The time I spent in Singapore and analyzing my data afterwards provided me with unique insights into the restorative potential of horticulture-based activities for older urban dwellers. This article briefly sums up the key findings of my project.

Potential Impacts of Urban Care Farming

In my analysis, I focused on three main aspects of urban care farming implementation:

- Social and therapeutic aspects
- Environmental impacts
- Urban planning aspects

These main aspects were further divided into subtopics that defined the details of my study, as seen in Figure 1.

Social and therapeutic aspects of urban care farming

This part of my project primarily aimed at older Singaporeans (aged 65+) and explored the level of their interest in horticultural activities. Additionally, I wanted to identify any specific demands and needs this age group would have in pursuing horticultural facilities, as these would affect their planning and design. As I interviewed a group of 30 older residents of an HDB block in Whampoa, three main findings on user preferences were crystallized:

- High level of interest in horticulture
- Location close to their home
- Presence of a leader/manager

Indeed, almost all participating residents expressed an interest in horticulture, ranging from a curiosity to try a new activity, to eagerness in starting as soon as possible. The level of interest often coincided with the level of previous experience with horticulture, as those with existing experience were generally more eager to engage, while those with less experience were more concerned about the way it would be organized, as they would need guidance.

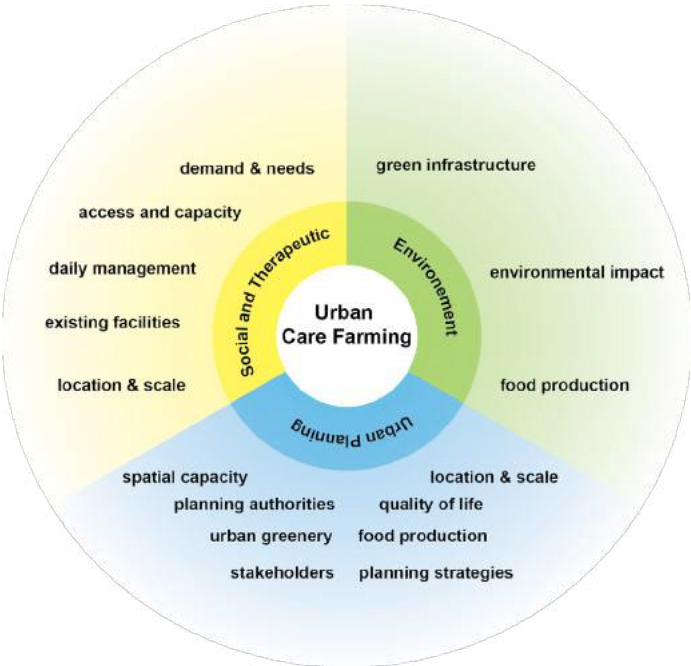


Fig 1.
Three main aspects of urban care farming and their subtopics (Developed by the author)

PROVISIONING	REGULATING	SUPPORTING & HABITAT	CULTURAL
Food Fresh water Wood and pulp Medicines	Urban temperature regulation Noise reduction Air purification Global climate regulation Moderation of climate extremes Runoff mitigation Waste treatment Pollination Pest regulation Seed dispersal	Habitat & species Maintenance of genetic diversity	Recreational Aesthetic benefits Cognitive development Place values Social cohesion

Fig 2.
Urban ecosystem classification with highlighted prioritized services in Singapore (Based on Gómez-Baggethun et al., 2013)

Similarly, a virtually unanimous response was given to the question regarding the participants’ preferred location for horticultural activities. With only one single exception, participants stated that proximity to their homes was crucial, and that a location requiring any form of transportation was prohibitive.

Complete unanimity was then reached in the matter of leadership. While a few participants expressed their preference to work individually (as opposed to the majority who would prefer group work), the presence of a leader or mentor was preferred without exceptions.

Environmental aspects

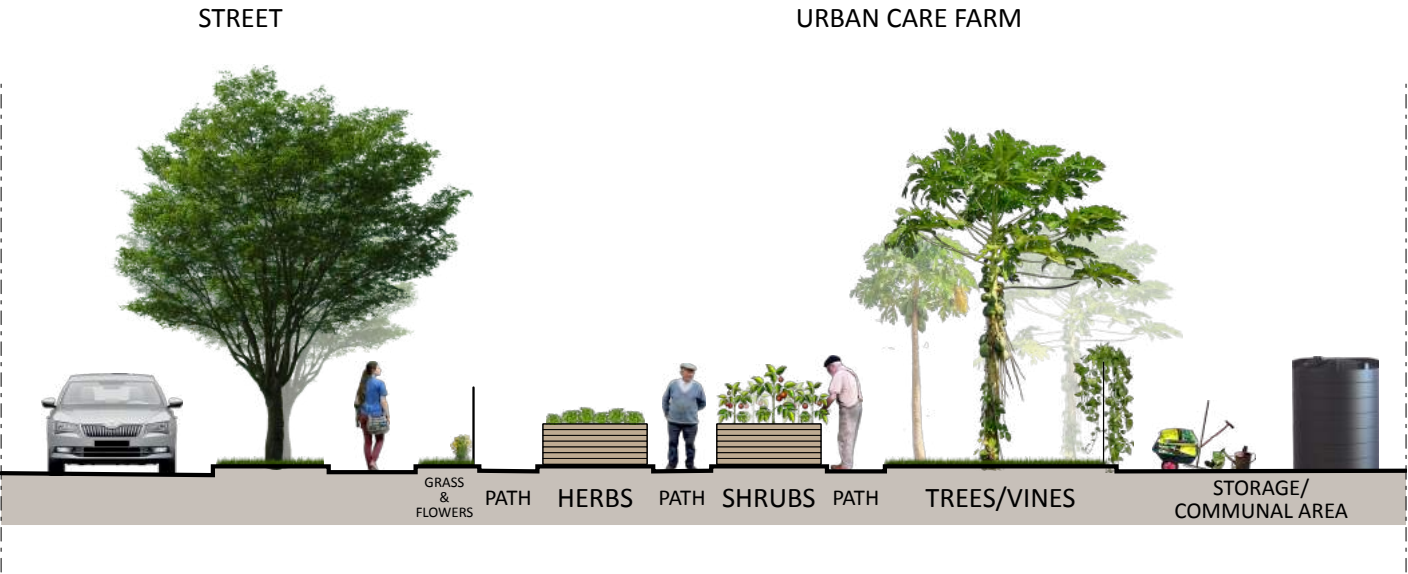
My environmental analysis of the impact of urban care farming was done through an assessment of urban ecosystem services provision. I used the classification introduced by Gómez-Baggethun et al. In 2013 and focused on three top prioritized urban ecosystem services in Singapore, as identified by Drillet et al. (2020) and Sieber and Pons (2015). Figure 2 shows an overview of all urban ecosystem services, with the three prioritized services in bold.

The air purification potential of urban care farms appears as the lowest of the three. As trees are the vegetation type with the highest air purifying capacity (which is still relatively low in the scope of a whole city), care farms growing plants would not create a huge environmental impact.

However, the recreational and aesthetic potential of urban care farms is a completely different issue. In both cases, urban care farms would add to the diversity of facilities already available in Singapore. In the case of recreation, urban care farms, similar to its existing community gardens, would offer a meaningful way for seniors to spend time outside, and, following the preferences mentioned above, they would spend farming time in their neighborhood with people from the same community. If we consider that a vast majority of respondents would prefer to work in a group, urban care farms could become a new kind of social platform in Singaporean neighborhoods with the potential to build and strengthen social contacts of local older residents.

Aesthetically speaking, urban care farms would also add to the visual diversity of outdoor elements in Singaporean neighborhoods. As entities with a leader/manager (this may be a remunerated employee) who would oversee not only the day-to-day operations but be also involved in the overall design of the facilities, a variety of simple layout principles could ensure that an urban care farm would be visually pleasing. Figure 3 below shows one example. Here, a concentric layout of an urban farm with a vegetation gradient starting as lowest on the edges and growing taller towards the center would enable passers-by to observe multiple vegetation types, while technical equipment and storage facilities would be tucked away in the center.

Fig 3.
A cross section of one side of an urban care farm with a concentric layout (Developed by the author)



Planning aspects

Before I start talking about my findings around the planning aspects of urban care farming, I need to point out that my research was conducted before the Covid-19 pandemic. This is an important fact to consider, as it depicts the situation before the pandemic impacted the aims and priorities of urban planning in Singapore.

I studied the spatial and formal planning situation in Singapore on two levels – at city level and local level of one neighborhood. The main message resulting from the study is that Singapore is at the forefront in support of urban greenery and food production.

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The main message resulting from the study is that Singapore is at the forefront in support of urban greenery and food production.

FLAT TYPE	HOUSEHOLD MEMBERS	% OF THOSE AGED 65+ IN 2020	NO. OF THOSE AGED 65+ IN 2020
1-room	2.00	46.11	0.92
2-room	2.60	27.99	0.73
3-room	2.80	24.94	0.70
4-room	3.60	13.78	0.50
5-room	3.90	11.31	0.44
Executive	4.10	10.73	0.44

Table 1.
Numbers of people aged 65+ in different types of HDB flats in 2020 (Developed by the author, based on data.gov.sg)

FLAT TYPE	NO. OF FLATS	NO. OF THOSE AGED 65+ PER FLAT IN 2020	NO. OF THOSE AGED 65+ IN 2020
1-room	77	0.92	70.84
2-room	79	0.73	57.67
3-room		0.70	0.00
4-room	249	0.50	124.50
5-room		0.44	0.00
Executive		0.44	0.00
TOTAL			253.01

Table 2.
Estimated number of senior residents in a sample HDB block in Whampoa (Developed by the author)

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However, an important question is whether enough space for urban care farming is potentially available, as the lack of space is one of the most cited barriers of urban agriculture in general.

The amount of physical space and formal support of urban greenery through initiatives such as Landscaping for Urban Spaces and High-Rises (LUSH) cannot be matched. Moreover, the intensified emphasis on local food production that would alleviate Singapore’s dependency on food imports further supports the idea of urban care farms.

However, an important question is whether enough space for urban care farming is potentially available, as the lack of space is one of the most cited barriers of urban agriculture in general, Singapore’s high population density was one of the key factors that led me to identify this city as the right location for my case study. In other words, I wanted to explore the situation in practice, to see whether lack of space is truly a major hindering factor for urban agriculture.

To find out whether enough space exists for urban care farming to cover the needs of older Singaporeans, I used statistical data on the occupancy in Housing Development Board (HDB) flats and applied these on the HDB blocks in my neighborhood case study location.

Table 1 shows the statistical data on flat occupancy by people aged 65+ in HDB flats.

I applied these data in my neighborhood case study location to find out how many older people would need to be catered for by urban care farms. Table 2 serves as an example of one HDB block. I did these calculations for each HDB block in my case study neighborhood and reached the aggregate number of 4,659 older residents.



Fig 4.
Case study area with numbers of older residents in each HDB block (Developed by the author)

As a next step, I roughly measured open outdoor spaces in the same area, which accounted for 71,700 sqm, and combined these data in one picture, see Figure 4.

However, when I compared this map with the land-use map of the same area, I had to remove the two largest open spaces, as they were zoned for educational facilities or as the subject of detailed planning. Hence, the potential area for urban care farming shrunk to 20,050 sqm.

For further calculations on how many people could be catered for in these spaces, I developed a concept of a basic urban care farm with three different types of layouts, as shown in Figure 5:

- Individual free-standing containers/raised beds
- Linear layouts
- Concentric layouts

In all these layouts, I considered 2 sqm of planting area per user (a common size of planting containers in urban community gardens) and calculated capacity for each layout, i.e., the number of users per sqm of total area. This capacity was lowest in case of the layout with individual containers and highest in case of the concentric layout.

I could then combine these calculations to see whether the existing open space in Whampoa would be enough to provide urban care farming opportunities for the 4,659 local older residents. As a result, it turned out that the space would be enough in case of the linear and concentric layout, though not in case of the layout with individual containers, see Table 3.

One can argue that these calculations are conceptual and lacking details and precision.

However, if we consider that they include all older residents in a given area (while we can hardly expect that full 100% of residents would participate in urban care farming) and they did not include any open spaces that are not on a surface level, such as carpark rooftops, the message they bring is clear: Even in such a densely populated city such as Singapore, there is enough physical open space for urban care farming. The main barrier then seems to be not a physical lack of open spaces, but formal access to their use.

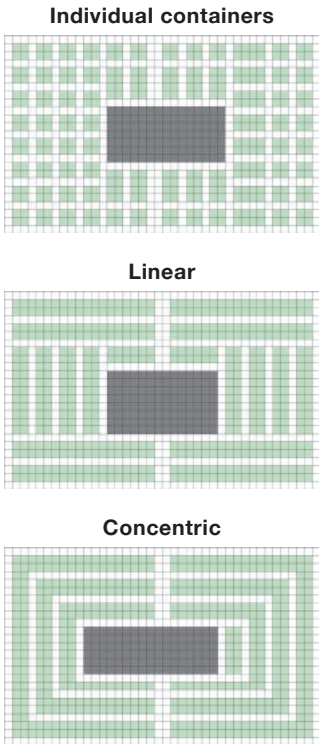


Fig 5.
Three layout options of a conceptual urban care farm: Individual containers (Top), Linear (Middle), Concentric (Bottom) (Developed by the author)

TYPE OF LAYOUT	CAPACITY (users/sqm)	MAXIMUM NO. OF USERS
Individual containers	0.188	3,769
Linear	0.244	4,892
Concentric	0.254	5,093

Table 3.
Urban care farming capacity of the existing open spaces in Whampoa by different types of layout (Developed by the author)

Summary

The topic of urban care farming implementation in dense cities is a very complex topic that cannot be fully contained in one article. Therefore, I chose the main points that carry and show the key findings of my project:

- There is a high demand for guided horticultural activities among older residents in Singapore.
- Location in the neighborhood is crucial.
- Facilities such as local urban care farms have the potential to become a new type of community social platforms that would offer new recreational opportunities to older residents.

• While available space in urban areas is undeniably scarce and precious, it is formal access rather than a physical lack of space that is the main impediment to the growth of urban agriculture. Prioritizing urban care farming or other types of urban agriculture by planning authorities is a key component of the future growth of urban care farming, and urban agriculture in general.

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The Rereading Resource Process (資源再読): Memu Earth Lab Landscape Design Workshop

text by
Kenya Endo
Yu Morishita
Toru Terada

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In those scenarios, what is it that one can trust in the end?
It must be something that your body has experienced.

Introduction

I (main author, Endo) have taught landscape architecture at the National University of Singapore (NUS) for more than four years. This teaching experience has guided me to realize the importance of first-hand experience, and how it brings light to student’s learning. This principle facilitates students’ full body and sensory engagement with the subject matter. More technically, in “embodied learning”, students who consciously use their bodies to learn are more engaged than those who are at a desk or computer (Paniaguai et al., 2018). It resonates well with landscape architectural education where the learning focus is on aspects that are emotional, physical and creative, more so than cognitive.

This belief derives from the fact that my teaching has always been centred around landscape construction, site engineering, and landscape design studios; all of which are applied subjects that require strong sensitivity in the spatial and physical context. Therefore, it is my hope that my students will become knowledgeable professionals who make sound design judgement based on their actual experience in the real world in the future, when our lives are more mixed with virtual reality, AI generated texts and images, simulated materials, and so on. In those scenarios, what is it that one can trust in the end? It must be something that your body has experienced.



Fig 1.
Magnificent landscape
of Taiki Town, Hokkaido
(Image credit: Kenya Endo)



Fig 2.
Examples of Embodied Learning
(Images credit: Kenya Endo and Ziyuan Zhang)

Memu Earth Lab in Taiki Town, Hokkaido, Japan was a place where I could practice my teaching belief, “embodied learning”. The lab prototypes new forms of experimental infrastructure for various kinds of grounded research (Memu Earth Lab, n.d.). Its past projects have engaged architects, ecologists, and sound artists. I decided to plan for a trip where students majoring in landscape can benefit. This is a good opportunity for them to explore outside the classroom setting, and to be exposed to cool temperate climate, local food, lifestyle, and allow Hokkaido’s natural environment and cultural practices drive their perception, realization, and inspiration.

Designing the Workshop

In the summer of 2023, a total of 14 students (7 each from NUS and the University of Tokyo) visited Taiki Town in Hokkaido. The 10-day workshop aimed to re-examine our urban lifestyles through understanding the local resources and natural environment. Unlike a typical spatial design exercise, the workshop took critical views on how we live our lives in Singapore/Tokyo. This was possible because we were able to step away from our daily routines completely, to immerse ourselves in an environment where the interactions between people and nature are much more intimate. We incorporated onsite activities that allowed the students to engage with local residents, various industry operators, as well as visits to natural and cultural heritage sites.

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This was possible because we were able to step away from our daily routines completely, to immerse ourselves in an environment where the interactions between people and nature are much more intimate.

The trip had a good mix of students with different training backgrounds, from landscape design, urban planning, to sustainability science. As a result, we had fruitful multi-disciplinary conversations that addressed emerging topics in the world, with grounded approaches and responses.

The workshop adopted a framework comprising the following processes.

Process 1: Read

During this process, students will understand the site context via online sources, maps, readings. They would define the topic/theme as a group and question what makes the site unique, what types of natural elements have influenced the way people live their lives, and how it has changed over time.

Process 2: Re-Read

Here, students will visit the site. They will embrace the environment with their five senses (seeing, tasting, hearing, touching, and smelling), and through dialogues with residents. By analysing the flow of resources, interplay between man and nature, they will unfold the potentials (or challenges) of the site.

Fig 3.
Examples of Embodied Learning
(Images credit: Kenya Endo and Ziyuan Zhang)



Process 3: Question-Raising & Responding

In this final step, students will convert the inspiration and learnings from the site into questions; a series of constructive questions that bridge Taiki Town’s experience with their own living environment. Through an in-depth self-reflective process, the overall goal is to develop critical perspectives on the way cities are operated, and how they live their lives within.

Site

Memu 芽武—where “ponds and lakes are formed by groundwater springing” in Ainu tribe language. Memu Earth Lab is located close to the southern tip of Hokkaido, where mountainous terrain ends, and flat agricultural fields extend towards the Pacific Ocean. It has a population density of 6.66 people per square kilo meters and dairy farming and fishery are its two main industries. Memu Earth Lab, a former racehorse farm, was started in 2011 as a research institute to study housing for cold climate zones, given the fact that January’s average temperature can be as low as -9 Degree Celsius.

Figure 4 illustrates the site context and excursion routes.

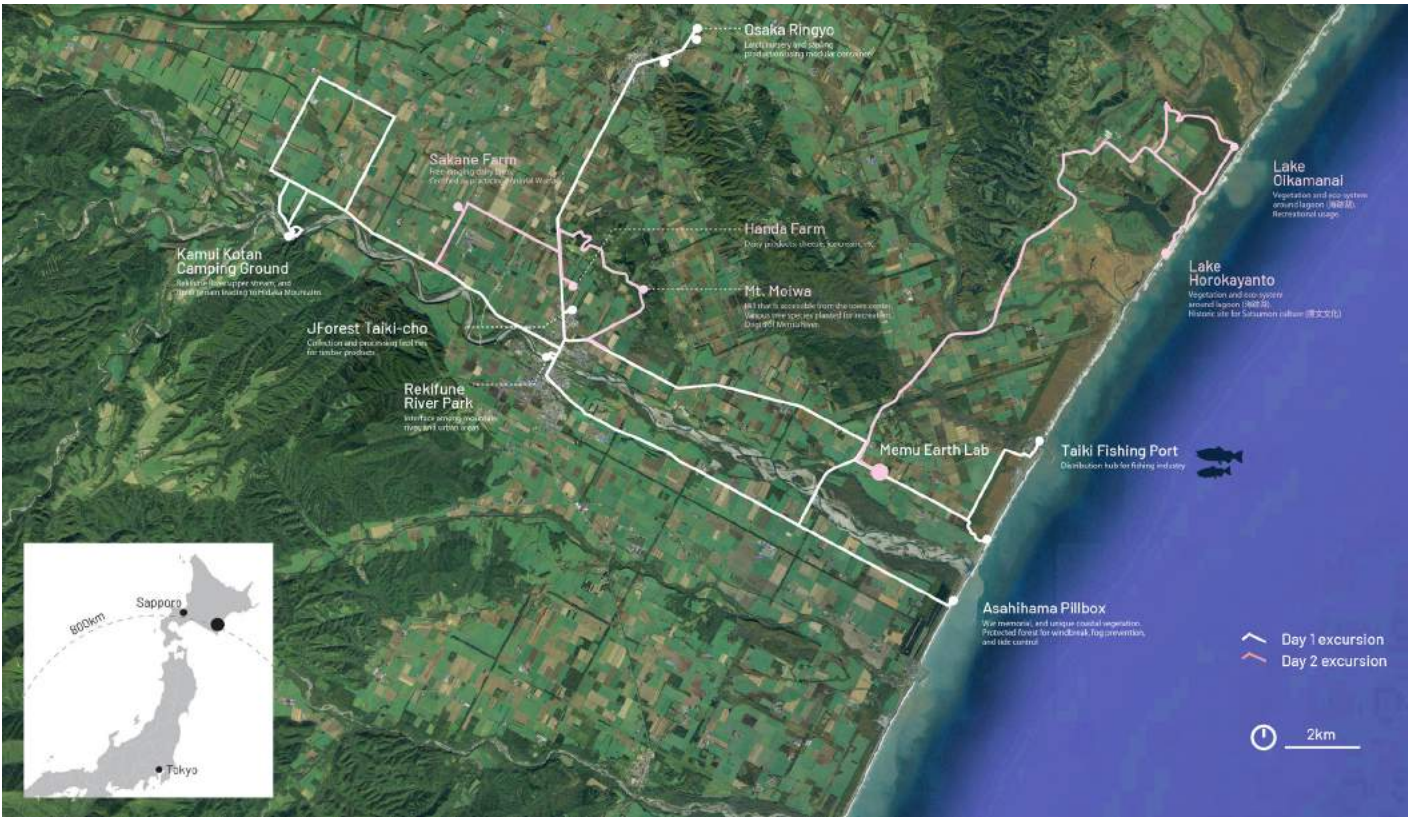


Fig 4.
Context of Memu Earth Lab
(Image credit: created by Kenya Endo with Google Earth aerial image as a base)

We identified four key focal areas to be studied, namely, “Food”, “Color”, “Night”, and “Boundary”. In this essay, I will focus on “Food” and explain each process of analysis from the perspectives of students.

Read—Intersection Between People and Wildlife

A number of online photos of Taiki Town illustrate the rich and diverse natural environment of the Tokachi Plain and the Pacific coast of Southern Hokkaido. A landscape consisting of woodlands, grassy fields, estuary, lagoons, and marine ecology, hosts a great number of wild fauna and flora in the region. And the experience of encountering such free-ranging wildlife is different from the animals we see animals in zoos, aquariums, or books. The proximity must play a crucial role in defining the relationship between people and wildlife. We examined how the intersection looks like, especially at a town whose local industry relies heavily on harvest from land and the sea.

Fig 5.
Taiki Town’s local industry; fishery, forestry, and dairy farm (Images credit: Ziyuan Zhang)





Fig 6.
Coastal habitats and vegetation
(Images credit: Ziyuan Zhang and Alyssa Tee)

The most common intersection is when we view wildlife from the lens of “natural resource”. It is interesting how our perception towards such innocent creatures changes suddenly when we consider them as part of industry. Take fish for an example. Once the fish is caught from the sea and transferred into an economic mechanism, they seem to lose their one-and-only-ness. In other words, one life of a fish becomes meaningless, but the collective mass starts to matter as an index of productivity. A group of fish is thereafter, translated into economic values based on their rareness and whether they are consumable, and furthermore, its meaning is changed to “food”.

Starting off the concept of “intersection”, some of the discussion during the pre-study period was the realization of how city dwellers (such as in Singapore and Tokyo) are distanced from wild animals and plants. Fish products we see at supermarkets in cities, for instance, are typically sliced and processed, and it is almost impossible to reimagine its original shape. We cannot tell how they actually swim in the ocean. Another example is bread; we don’t question how wheat looks like when we eat bread, and how it grows in the fields.

The process of producing and distributing mass amount of food to consumers effectively must have made it rather difficult for us to trace back the origins of them and what hidden processes it took before delivered to our table.



Re-Read

The field trip and interviews with the locals in Taiki Town, however, tell us a different story. The process of transforming wildlife into a “dish on a table” is rather transparent, and one can see through the interactions made along the way. For example, we heard how the hunter Michina-san “learns about nature through deer hunting and dismantling”. This point implies that there is a “silent dialogue” between the hunter and the hunted, and the process of killing a deer is not a one-way action. Similarly, dairy farmer Ryota-san takes care of his cows on a daily basis with animal-welfare in mind, and describes how milk’s color and texture changes according to weather conditions. In addition, Memu Earth Lab’s chef Tsukasa-san thinks carefully about recipe that takes the best out of local harvests every day and every season.

From these conversations, we understood that the process of harvesting, and preparing it to become a food on the table is a long relay of care and respect.

Another interesting case that we noticed in the local market is that most of the vegetables are sold with the producers’ photographs, together with tips of how to eat them tastefully. The proximity of producers and consumers also makes the action of “eat” a more meaningful experience than how we do in cities.

Question Raising—What Does Food Mean to Us?

After the field work, site observation, and most importantly, tasting the locally harvested food every day, we have come to question, “what does food mean to us? Do we enjoy eating the food we have in front of us?”

A simple answer to this question is from its physical aspect; food is the energy source to sustain our lives. But, the experience in Taiki Town unlocked more ways to approach this question. How about its mental and social aspects? We have observed multiple cases that food was a connector between people and people. As we have seen in the previous section, the preparation of a meal is rather a long process that involves many “silent dialogues”. This is how we realized that food can be the media to nurture communication and bring people together with joy. We can easily anticipate lots of conversations like, “where was this ingredient harvested?”, “how was it cooked?”, “this year’s harvest is lower than previous years”, etc., taking place very commonly in Taiki Town. The more voices like these, the stronger the food identity of the region will become.

Response

To take things more critically, are we fully making use of the potential that food has in bridging people and people? Living in large cities like Singapore and Tokyo, it is very common that we cannot see the producers’ face. We are probably too busy to pay attention to the food that we eat. Do we remember what we ate this morning, and do we care about where the ingredients come from, as well as who prepared the dish for us? What are the consequences waiting for us, if we are blind to what we eat?

The literacy towards food will be difficult to inculcate, living in a condition where we tap our smart phones and just wait for our meal to arrive. We can order groceries without checking how they look like or come from. In such society, we may not be eating with joy because we are simply “fed”. Being blind to what we eat can also lead to other consequences; we may lose the appreciation for food, which leads to more food waste. We may become insensitive to taste or indifferent to farmers, so that cost becomes the only factor for deciding what to buy.

Fig 7.
Deer disassembly by local hunter (Image credit: Ziyuan Zhang)



Fig 8.
Harvesting wild mushrooms in the woods (Image credit: Ziyuan Zhang)



Top / Fig 9.
Memu Earth Lab's chef
preparing food freshly
harvested nearby
(Image credit:
Ziyuan Zhang)



Bottom / Fig 10.
Dishes of the night
(Image credit:
Ziyuan Zhang)



How then do we mitigate the gap between convenience and sustainable consumption? Some digital technologies allow this to happen—for example, food subscription services, chatting service with producers. These existing platforms should help us reestablish the relationships with producers or raw ingredients even while living in cities. Concepts like farm-to-table has become a trendy movement in cities like Singapore too. Indeed, technologies and ideas can contribute to shorten the physical distances between producers and consumers, however, it is not exactly the same as the case in Taiki Town. In Taiki Town, there was a live interaction between people and people as well as between people and wildlife, over the course of harvesting, food preparation, and dining. Therefore, it is useful to look for new approaches that help recover the connections that we might have lost in our urban lives.

“

We have also come to realize that instead of each ingredient, perhaps the importance of Singapore’s food culture is placed on its diverse cooking methods.

Key Takeaways

In reflection, the students highlighted the rare experience in Taiki Town—encountering fauna & flora as they exist in the wild, their disassembly and preparation processes, and the joyful dining experience. During the workshop, they had many occasions to compare and question the food situation in our normal lives. For example, in Singapore, where more than 90% of food is imported (Singapore Food Agency, 2022), we hardly question where the food comes from and how they are distributed to our nearby markets. We have also come to realize that instead of each ingredient, perhaps the importance of Singapore’s food culture is placed on its diverse cooking methods.

In recent Singapore’s urban and landscape planning, there are initiatives that activate interactions with nature and local communities through food, and food production. The promotion of “30 by 30”; a vision of producing 30 percent of Singapore’s nutritional needs by 2030 can be seen as one. Notably, the ongoing Lim Chu Kang Master Plan by the Singapore Food Authority challenges how food production facility can connote as public grounds for recreation and engagement (Tan, 2023). The Gardening with Edibles program by National Parks Board from 2020 is another, which invites Singaporeans to grow edibles at home, amid the social changes caused by the pandemic (Sia et al., 2023).

In relation to the findings from the workshop in Taiki Town, the hints for long-term sustainability of such initiatives could be the engagement by the general public. Food as we know is grown almost in a black-box condition by anonymous operators, but it does not have to be so entirely. I echo the actions initiated by the government to stimulate a gradual shift to enhance transparency, and to increase opportunities for the private sectors, various professionals, and farming-enthusiasts to participate. Beyond that, what would “you” do to make a change?

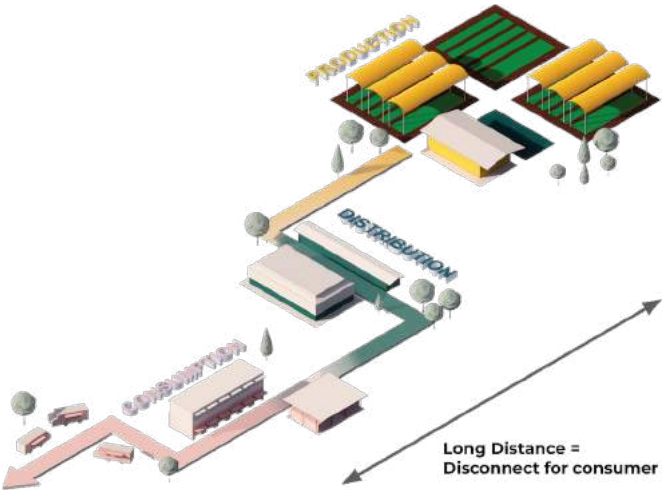


Fig 11.
Diagram of food supply around Memu Earth Lab, illustrating the proximity between producers and consumers (Image credit: created by Alyssa Tee, Lipeng Zou, Aoi Morita, and Mengqi Liu)

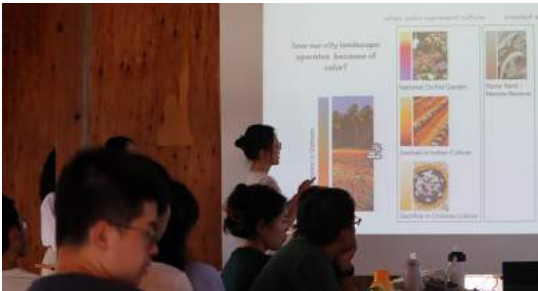


Fig 12.
Sharing and discussion session with NUS and University of Tokyo students (Image credit: Hiroto Harada)

Acknowledgment

This workshop had successful results thanks to all students participated. In addition, we had additional support from Prof. Makoto Yokohari from the University of Tokyo, and staff from Memu Earth Lab. Full document is available at: https://issuu.com/nusdoa/docs/memu_earth_lab_landscape_design_workshop

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Extending Contemplative Landscapes in a Tropical City-state

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The recent research on Contemplative Landscapes has shown that they evoke positive brain activity patterns, reflective of a state of better mental wellbeing.

Introduction

The recent research on Contemplative Landscapes has shown that they evoke positive brain activity patterns, reflective of a state of better mental well-being (Olszewska-Guizzo, A., Sia, A., Fogel, A., Ho, R. 2022). The Design Guidelines for Contemplative Landscapes, published by the National Parks Board (NParks) in 2022, leverages on such research findings to guide landscape professionals on how to apply the Contemplative Landscape Model (CLM) to design and implement landscapes that ensure mental well-being.

The CLM can be put into action by first identifying existing Contemplative Landscapes nestled within Singapore’s parks, gardens, and urban areas, which are accessible to all. Secondly, newly designed Contemplative Landscapes can be curated through interventions to increase the CLM scoring of existing or upcoming landscape projects.

What is a Contemplative Landscape?

The concept of Contemplative Landscapes was introduced over a decade ago by Dr. Agnieszka Olszewska-Guizzo (Olszewska, A., Marques, P. F., & Barbosa, F. 2014). These landscapes have the potential of inducing positive changes in the brain activity of the viewer even with passive exposure. Over the years, through series of neuropsychological experiments, Contemplative Landscapes have been shown to encourage contemplation, introspection, and a sense of peacefulness, with research indicating its positive effects on mental health and well-being of people in high-stress environment (Olszewska-Guizzo, A. 2023). They are characterised by features such as quiet seating areas, natural elements, and scenic views that encourage reflection and relaxation.

Contemplation is a key aspect of passive recreation, involving activities with minimal use of facilities and low environmental impact, such as walking, hiking, bird watching, and other sedentary pursuits. It is associated with immersing oneself in natural scenes while simply relaxing and being in nature, which is a primary motive for urban dwellers visiting parks.

Contemplative Landscapes offer self-directed passive viewing of natural scenes and are commonly found in settings such as gardens or parks, aiming to enhance the mental health and well-being of users (Olszewska-Guizzo, A. 2018).

The definitions of specific healing garden types, such as therapeutic garden and contemplative garden, often cause confusion. It’s important to note that Contemplative Landscapes may be found in therapeutic gardens.

Therapeutic gardens serve as a dedicated space for horticultural-based interventions. These gardens are purposefully designed to meet the physical, psychological, and social needs of the individuals who use them. Plants and plant-based activities or physical activities are carried out in these gardens as remedial interventions to support the goals of the individuals. (Elizabeth R. Messer Diehl, 2017)

Contemplative gardens are designed to encourage a restorative experience, emphasising emotional and psychological restoration rather than physical ability. These landscapes often focus on reflection and passive viewing of natural scenery.

Contemplation is often defined as looking beyond and examining issues that are larger than oneself. This distinction suggests the inclusion of long views in the landscape to facilitate introspection (Elizabeth R. Messer Diehl, 2017).

Identifying Existing Contemplative Landscapes in Singapore

Singapore has an extensive network of tree-lined streets, park connectors, around 400 parks, and four nature reserves.

By 2030, the city-state will develop up to 300km of Nature Ways and 500km of park connectors. This helps to ensure that every household in Singapore is within a 10-minute walk from a park. The provision of nearby open spaces or neighbourhood parks for recreation in residential areas is an essential component of urban planning. ‘Nearby nature’ is crucial to people; the natural environment is often experienced as a preferred or aesthetic setting that plays a significant role in recovering from mental fatigue, providing therapeutic benefits (Kaplan R and Kaplan S, 1989).

Elderly participants engaged in plant and nature-based activities, such as making herbal scented bags, and gardening at Yishun Pond Park Therapeutic Garden.



A tranquil setting with clear waters and open skies at Bukit Batok Nature Park, an ideal place for reflection and relaxation.



The increasing burden of mental health issues in urban populations is an urgent concern, placing significant pressure on the healthcare system. Projections indicate a rise in individuals facing conditions such as cognitive disorder, social isolation, frailty, and other disabilities (Olszewska-Guizzo, A. 2018). Contemplative Landscape design has been shown to improve the state of mental well-being. The intention is to make these landscapes highly accessible to the public throughout Singapore, promoting a well-balanced and healthy mental state amongst the community. Multiple research studies have indicated that interaction with the natural environment and green spaces can significantly enhance the well-being of various demographic groups.

Yishun Pond Park Therapeutic Garden (top) and Yishun Park (bottom) are located within a 500m walking distance from Khoo Teck Puat Hospital.



Furthermore, research on Contemplative Landscapes suggests that specific features can unlock more potential health benefits as compared to generic green spaces. This highlights the importance of considering the unique qualities of natural environments in promoting well-being. For example, naturalistic elements such as water, diverse planting, and layered, undulating landscapes are more effective in promoting well-being compared to generic flat spaces that lack such elements.

Creating Contemplative Landscapes near healthcare facilities provides opportunities for hospital visitors and patients to enjoy an array of nature-based experiences to help improve their mental health and well-being. Such efforts are already in place. For instance, Khoo Teck Puat Hospital is just a short 300m walk away from Yishun Park and 500m walk away from Yishun Pond Park Therapeutic Garden both of which have incorporated Contemplative Landscape scenes. The proximity of these green spaces to healthcare facilities makes it easily accessible for users of these facilities to benefit from such natural environments. Promoting opportunities for patients and the public to stay connected with nature can be a valuable approach to addressing the evolving healthcare needs of Singapore’s ageing population.

Utilising the CLM, landscape architects from NParks are assessing existing parks, gardens, and open spaces throughout Singapore to identify green spaces with high contemplative quality, including therapeutic gardens and non-urbanised areas within parks and urbanised areas.

Contemplative Landscapes Case Studies

Bishan Ang Mo Kio Park (Viewing point) – Non-Urbanised Green Area

The Riverside gallery at Bishan-Ang Mo Kio Park showcases a picturesque meandering river, adorned with lush banks of wildflowers and a variety of terrestrial and aquatic plants that create diverse micro-habitats. Strategically positioned resting spots, shaded by canopy trees within the serene landscape, offer prime views of the undulating landform, providing users with a visually attractive and restorative environment.



Top / Bishan Ang Mo Kio Park (Viewing point).
Middle / Singapore Botanic Gardens Learning Forest.
Bottom / Esplanade Theatre Outdoor Garden.

Singapore Botanic Gardens Learning Forest – Non-Urbanised Green Area

The Learning Forest at the Singapore Botanic Gardens features a lush, restored lowland rainforest and freshwater wetland ecosystem. A network of boardwalks guides visitors to tranquil resting spots for reflection and relaxation. The open spaces among the greenery and water bodies create a pleasant scene for respite and solitude, allowing for a peaceful retreat. The area also supports a high diversity of plant and animal species, thriving within this natural environment.

Esplanade Theatre Outdoor Garden – Urbanised Green Area

The Esplanade Outdoor Theatre is nestled amidst lush greenery, with the entrance transformed into a wild garden landscape, where the combination of softscape and hardscape features creates a contrast to the urban environment. Natural lines meander, encouraging visitors to look up to the sky. The landscape showcases various unique tree species, such as the Rainbow Gum Tree (*Eucalyptus deglupta*) with its colourful bark and the Gelam Tree (*Melaleuca cajuputi*) with its distinct papery bark. Outdoor benches are thoughtfully placed among fragrant and colourful plant species to enhance the site aesthetics and mental well-being of visitors. Furthermore, the benches are strategically positioned to face the water feature, effectively masking noise from city traffic.

With NParks’ aim of providing a park within 10-minute walk for every household by 2030, the Contemplative Landscapes in parks initiative offers an easy solution for residents to gain mental well-being benefits through just a few minutes of viewing the Contemplative Landscape scenes. These sites can also serve as a support for health interventions through nature-prescription programme by healthcare institutes, promoting mental well-being. Medical practitioners can encourage patients and users to visit these sites, engaging in self-directed and passive interactions with nature. NParks will progressively identify Contemplative Landscapes throughout Singapore, collaborate with partners to introduce them across the island, and publicise these locations for the public to enjoy, along with providing information on their benefits.

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These sites can also serve as a support for health interventions through nature-prescription programme by healthcare institutes, promoting mental well-being.

Curating New Contemplative Landscapes

While Singapore already has an extensive network of green spaces including nature reserves, nature parks, parks and park connectors, the option of adding more green spaces for recreation to the highly urbanized and land-scarce city-state is limited. To maximise the well-being benefits of existing parks, it is useful for landscape architects to curate new Contemplative Landscapes within these green spaces. For example, since 2016, NParks has introduced 14 therapeutic gardens, which are designed based on scientific research to facilitate and encourage people's interaction with nature. Each area is carefully planned to provide visitors with a serene and tranquil environment that meets the physical, psychological, and social needs of those using the garden.

In the design of therapeutic gardens, Contemplative Landscape scenes are carefully curated, involving the thoughtful selection and arrangement of elements that align with the characteristics of the CLM. Natural elements such as water features, terrain, and existing trees, along with sensory experiences, are utilised to create environments that foster mental well-being and encourage contemplation. The design of the therapeutic garden considers both aesthetic elements and functionality to ensure that the gardens effectively serve their intended purpose as spaces for therapeutic horticulture, relaxation, and healing.

The KPMG Wellness Garden at East Coast Park offers a 360-degree panoramic view, encompassing both contemplative and therapeutic components, such as the pond, coastal landscape and horticultural activity spaces. The showcase of layered landscapes creates a sense of tranquility, with the elevated deck standing out as the signature viewpoint of the therapeutic garden, offering a distinct perspective of the overall garden. In addition to the stunning coastal and pond views, users can observe the highly diverse landscape, appreciating its various forms, colours, and habitats, including aquatic and coastal plants.

NParks is currently exploring opportunities to apply the CLM into new sites and expand its application beyond parks and gardens to other public spaces and future developments. The Design Guidelines for Contemplative Landscapes publication provides an overview of the need for CLM, instructions for scoring, design considerations, and case studies in Singapore and internationally. To strengthen understanding of the guidelines, CUGE offers training courses for professionals and students in landscape architecture, urban planning, and architecture, with the goal of equipping the industry to effectively utilise the CLM.

Exploratory Initiative - Contemplative Landscape Automated Scoring System (CLASS)

The concept of Contemplative Landscape has artistic origins but with the rigorous science behind the testing of the CLM, it has evolved to become a fully operational, technical term. This has unlocked diverse opportunities for its use by computational systems, such as the automatization of landscape evaluation.

In their work, Navickas et al. (2016) introduced the Artificial Intelligence model CLASS, which stands for Contemplative Landscapes Automated Scoring System. It was designed to verify the consistency and reproducibility of the CLM scoring process. Subsequently, researchers from NeuroLandscape expanded upon CLASS, transforming it into a system. This system, utilizing CLM, can autonomously assess any number of landscape scenes basing solely on appropriately captured digital images, eliminating the need for experts to evaluate and optimize spaces in person. The implementation of CLASS facilitates a rapid and cost-effective evaluation and CLM-oriented optimization of numerous landscapes.

CLASS has the potential to serve as an automated tool for landscape designers, allowing them to assess the outcomes of their projects efficiently.

This methodology could also benefit policymakers in the evaluation of existing and planned interventions, aiding in the decision-making process.

CLASS was at its time an exploratory work and still has limitations (for example, landscape photos have specific requirements). A crucial direction for future development of the CLASS would be to relax the constraints associated with the photo requirements. Another future research direction on CLASS involves adjusting it to an area of interest (for example an entire city) through the integration of CLASS with digital mapping tools. Additionally, CLASS could take into account local characteristics, such as climate, cultural elements, local flora and fauna, among other highly site-specific features. Currently, the NeuroLandscape team is leveraging the new state-of-the-art Technology to expand CLASS aiming to create a first of its kind tool known as the Mental Health Digital Twin (MHDT). This will facilitate the comprehensive study of the status of mental health impacted by the Contemplative Landscapes in selected European cities as supported by the GreenInCities, Horizon EU grant (2024). The development of the CLASS represents a significant potential advancement in research for the CLM model. Such advancements are innovations that NParks may consider.

Conclusion

This article showcases examples of Contemplative Landscapes in Singapore, which offer visitors the opportunity to take a few minutes from their busy schedules to experience the positive mental well-being effects associated with such landscapes. Landscape professionals can refer to these examples and the Design Guidelines for Contemplative Landscapes to assist them in implementing design interventions to elevate the quality of upcoming landscape projects and to mainstream the adoption of CLM. The passive exposure to such landscapes, as well as the integration of natural elements within city environments, can play a significant role in shaping positive mental health outcomes and contribute to a more liveable Singapore.

Scan here for a digital copy of the Design Guidelines for Contemplative Landscapes.



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IFLA ASIA-PAC LA Awards 2023

The IFLA Asia-Pacific region Landscape Architecture Awards, also known as the **IFLA ASIA-PAC LA Awards**, provide an international platform to showcase and promote the achievements and work of landscape architects in the Asia-Pacific region. These prestigious awards aim to create a continuous awareness and recognition of landscape architecture together with like-minded partners and professions that have played a key role in shaping our cities and environment towards a better future.

Outstanding Award

CapitaSpring

Category of submission Skyrise Greenery IFLA Member	Company Organisation COEN Design International Pte Ltd	Landscape Architects Ng Haley Harrison, Ann Teo	Builder Dragages Singapore Pte Ltd
Project size in SqM (m²) 93000	Landscape Architect Firm COEN Design International Pte Ltd	Architecture Firm Bjarke Ingels Group, RSP Architects	Landscape Contractor Nature Landscapes Pte Ltd
Client CapitaLand Singapore Limited		Civil Structure Engineer Arup Singapore Pte Ltd	

CapitaSpring is a 51-storey integrated development comprising offices, serviced apartments and retail units. It is located in the heart of Singapore’s Central Business District, on the site of the former Golden Shoe Carpark. The Gross Floor Area (GFA) of the development is 93,000 m². It consists of 29 floors of Premium Grade A offices, a 299-unit serviced residence and a 9-storey podium that mainly houses a multi-storey carpark. The development also houses retail units, a food centre at Level 2 and 3 and a single-level basement to locate back-of-house facilities and a M&E plant.

The 280m-tall development offers work, live and play spaces in a vertically connected environment, redefining the interactive possibilities for the workspaces of tomorrow.



Its iconic four-storey Green Oasis from Level 17 to 20 offers open-air, landscaped and technology-enabled shared amenities and social spaces for the community, while adding vibrant green hues as part of the building’s façade design. The Green Oasis comprises about 4,000 m² of landscaped area that is home to over 38,000 plants, with trees that can grow to a height of 10 m. It also offers a variety of work-live-play amenities such as a yoga alcove, jungle gyms, ideation nests, work pods and a café.

The Sky Garden at Level 51 is the highest point of CapitaSpring, and Singapore’s tallest publicly accessible observatory deck. Another highlight is Singapore’s highest urban farm, which has five themed gardens. These urban gardens, which spans almost 5,000 sq ft, supply fresh produce to the F&B units in the building. There is also an amphitheatre, which can be used for community activities, lifestyle events and performances.

Other key environmental and social considerations in the design include the provision of ample naturally ventilated open spaces, extensive greenery (Green Plot Ratio of more than 14), an ultraviolet germicidal irradiation system and high-efficiency filters for better indoor air quality, contactless destination control system, integrated cycling connectivity, bicycle lots and end-of-trip facilities as well as electric vehicle parking and charging lots.

CapitaSpring



Bukit Timah Railway Station and 9 Mile Platform

Award of Excellence

Bukit Timah Railway Station and 9 Mile Platform

Category of submission Cultural and Urban Landscape IFLA members	Company Organisation Grant Associates Singapore Pte Ltd	Architecture Firm Kay Ngee Tan Architects	Lighting Designer Nipek Pte Ltd
Project size in SqM (m²) 43000	Landscape Architect Firm Grant Associates Singapore Pte Ltd	Civil Structure Engineer Lee & Lee Consultants Pte Ltd	Quantity Surveyor BCM Consultants Pte Ltd
Client Urban Redevelopment Authority	Landscape Architects Mr Stefaan Lambreghts, Ms Libby Tandian	Builder Towner Constructions Pte Ltd	Client Advisor National Parks Board
		M&E Consultant Icon Engineers LLP	
		Landscape Contractor Garden Works Pte Ltd	

This completed landscape project is for the new Rail Corridor node at Bukit Timah, comprising two sensitively-restored buildings—the Railway Station and Railway Staff Quarters—set in a completely revitalised landscape.

The landscape provides a welcoming node to the Rail Corridor, a place for rest but also for exploration and discovery of both heritage and biodiversity. Our design defines the open spaces and sets the scene by framing views and screening adjacent developments - providing visitors with the opportunity to appreciate heritage within an authentic and biodiverse setting. Heritage in Nature for a City in Nature.

As part of the heritage narrative, plant species commonly found in kampongs back in the 1950s and 1960s were added. By preserving existing, sometimes undesirable vegetation and allowing for the spontaneous, the entire landscape has an instant impact and a rustic non-manicured feeling. Our carefully crafted rustic design is less maintenance intensive, adding further environmental benefits.

The most intriguing areas on site are where the old, the new and the spontaneous plants come together, creating surprise and unique visual excitement.



Award of Excellence

Campus in a forest

Category of submission Cultural and Urban Landscape IFLA members	Client National University of Singapore	Landscape Architect Firm NUS SDE with DP Green	Landscape Contractor Prince Landscape
Project size in SqM (m²) 450	Company Organisation National University of Singapore	Landscape Architects Yun Hye (NUS), Varit, HeYe, Weng Fai(DPG)	Other Consultants / Implementers / Contributors NUS University Campus Infrastructure Team
		Architecture Firm NUS SDE with CPG Consultants	

Inspired by the rich biodiversity and vibrant ecosystems found in Singapore’s original forests, an open space upgrading project of renovated buildings on a university campus aims to regenerate nature into a contemporary built environment.

The project is divided into four spaces, each with its unique features. The first space, *Wild Hill* along the main staircase, serves as the primary gateway of the renovated buildings. It involves uncovering previously concealed landforms and is designed to mimic a forest ridge. The second space, *Jungle Courtyard*, seeks to create structural and biological complexity motivated by multi-tiered tropical rainforests. *Rewild Edges* is the third space that comprises a series of vegetation strips featuring a harmonious blend of pre-existing trees, alongside fauna attractive understory species that are particularly appealing on sloped areas.

Finally, the fourth space, *Nasi Ulam* forest garden, is situated on a backyard lawn with spontaneous plants and incorporates edible landscape components that were introduced by a local farmer and student volunteers.

Together, these four spaces recreate a diverse biological community as a whole that provides ecological functions and optimizes resource efficiency. It also serves as an invaluable educational asset and strengthens human connections to nature toward a more environmentally sustainable campus landscape.

Award of Excellence

Woodlands Healing Garden

Category of submission Parks and Open space nonMember	Company Organisation Greenearth Consultants Pte Ltd	Architecture Firm Ten Architects Pte Ltd	Landscape Contractor Landscape Engineering Pte Ltd
Project size in SqM (m²) 14744	Landscape Architect Firm Greenearth Consultants Pte Ltd	Civil Structure Engineer Harvest Consultants Pte Ltd	Lighting Designer CCA Consultants Pte Ltd
Client National Parks Board	Landscape Architects Terence Tan, Ashley Tan, Mardiah Hisham	Builder Landscape Engineering Pte Ltd	Quantity Surveyor D+J Consultants Pte Ltd

“Heart” is the core of the Healing Gardens, with the forms and flows shaped by care and concern for its users. Easing patients and public alike away from the urban hardscapes to nature’s restorative softscapes, the park functions as a place for all to relax and recover.

Woodlands Healing Garden is the **largest therapeutic garden** in Singapore where it aims to **enhance the psychological well-being and physical health of the users**.

Sloping pathways connect pavilions, open fields for activity and tree sanctuaries, allowing all to explore and experience the hillside with ease. Entrances and vistas are designed to calm and clear the mind, with materials and planning carefully curated to facilitate this process.

Woodlands Healing Garden





Award of Excellence
Sungei Tampines

Category of submission Parks and Open space nonMember	Company Organisation AECOM Singapore Pte Ltd	Civil Structure Engineer AECOM Singapore Pte Ltd	Lighting Designer AECOM Singapore Pte Ltd
Project size in SqM (m²) 59000	Landscape Architect Firm AECOM Singapore Pte Ltd	Builder Eng Lam Contractors Co Pte Ltd	Quantity Surveyor AECOM Singapore Pte Ltd
Client Public Utilities Board	Landscape Architects Mel Yip Sui Ling, Ng Cha Mem, Lim Shu Yu	Other Consultants / Implementers / Contributors Greenearth Landscape Consultant Pte Ltd	
	Architecture Firm AECOM Singapore Pte Ltd	Landscape Contractor Nature Landscapes Pte Ltd	

Sungei Tampines is located near to a residential neighbourhood, school and the rustic Tampines Eco Green park. Prior to the development, it is solely serve a drainage function, our design objective is to transform this transient space into a leisurely destination where people can slow down and stop to enjoy the nature.

Named after the “Tempinis” tree (*Streblus elongatus*) that grew in the area, Sungei Tampines is a 3.2km concrete canal along waterway flowing northwards through the heartlands of Tampines and Pasir Ris before transforming to a natural mangrove-lined river before it goes out to the sea.

Interconnected with this blue ribbon (water), is the Tampines Park Connector (PCN) that runs alongside it. Linking Bedok Reservoir Park to Pasir Ris Park, the 7.0km Tampines Park Connector runs along housing estates, providing residents convenient access to the nearby parks.

Linking nature with exercise, healthy air, Sungei Tampines will give people a reason to enjoy the outdoors and be part of the community, within the heartland.

Sungei Tampines

Honourable Mention
PUNGGOL GREEN

Category of submission Parks and Open space IFLA Member	Company Organisation DP Green Pte Ltd	Architecture Firm DP Architects Pte Ltd	Landscape Contractor ISO Landscape
Project size in SqM (m²) 12300	Landscape Architect Firm DP Green Pte Ltd	Civil Structure Engineer BECA	Lighting Designer DP Lighting Pte Ltd
Client People's Association	Landscape Architects Thun Kongsub	Builder Hua Chang Construction Pte Ltd	Quantity Surveyor Threesixty Cost Management



As cities develop, opportunities abound in re-thinking the use of sterile space within infrastructural land. Punggol Green takes on this rare opportunity, **turning disamenities into amenities and reclaiming places for the people.**

This placemaking project garnered ideas generated from numerous rounds of public engagement workshops, which were distilled, embraced and celebrated into a well-loved community space for play, imagination and colour, injecting joy into everyday living. A successful transformation of the underutilised space under the Light Rapid Transit (LRT) viaduct into **a vibrant 500m length of Social & Wellness Linear Park through innovative and creative ways.**

The Park sits in the “Heart of Punggol”, in sync with aspirations in the Singapore Green Plan, and stitches existing and upcoming developments, including One Punggol; it offers **a significant new social spine** for the area as well as a low carbon transportation mode through walking and cycling; a linear park experience that **foster community, enhance value, accommodate recreation, facilitate connectivity and improve social exchange, a sustainable corridor that supports mobility, public welfare, and inspires innovation in open space.**

PUNGGOL GREEN

Embracing the Role of Landscape Architects in Climate Change Mitigation: Insights from Conversations across Asia

text and interviews by
Yun Hye Hwang
with
Erik Velasco (Velasco)
Chi Yung Jim (Jim)
Jinhyung Chon (Chon)

“

The efficacy of nature-based climate solutions is challenged by knowledge gaps in urban biogeochemistry and a dearth of comprehensive appraisals regarding the role of green infrastructure within urban ecosystems.

The urgency of climate change confronts our world as a paramount challenge. With approximately 40% of energy-related carbon dioxide (CO₂) emissions attributed to infrastructure, buildings, and construction¹, the need for action is undeniable. In this context, landscape architects, situated at the crossroads of creative thinking and scientific knowledge, uniquely possess the capacity to address society’s imperatives without exceeding the planet’s ecological thresholds.

In 2020, a coalition of landscape architecture firms in Singapore united with fellow planners, architects, and aligned organizations in declaring a climate emergency². This collective commitment extends to proactive measures, including acknowledging natural environments for carbon sequestration, advocating for the adoption of low embodied carbon materials, and embracing the principles of regenerative design. Nonetheless, the efficacy of nature-based climate solutions is challenged by knowledge gaps in urban biogeochemistry and a dearth of comprehensive appraisals regarding the role of green infrastructure within urban ecosystems.

This article encapsulates dialogues with three scholars, all actively engrossed in combating climate change through the integration of urban green spaces in Singapore, Korea, and Hong Kong. Through synthesis of their perspectives, this article underscores the critical role landscape architects play in tackling climate change within urban landscapes.

Q1. In practical and academic domains, a key challenge is the absence of a singular platform that adequately measures and assesses the role of urban green spaces in mitigating and adapting climate change. While environmental designers perceive these spaces as influential in curbing air pollution and countering urban heat, scientists often voice concerns over limited frameworks to comprehend their biophysical efficacy. These disparities might arise from knowledge gaps or a lack of cross-disciplinary insights. Considering your research, could you highlight the specific knowledge, or information that designers should acquire to tackle this issue?

Velasco: Urban green spaces, pivotal in climate change adaptation, often rely on benefits observed in natural ecosystems, overlooking the altered conditions of urban trees and plants within built environments when assessing their role in climate change mitigation. Assessments on carbon sequestration typically use forest-based equations, overlooking turfgrass and soil carbon contributions. Much of the carbon uptaken returns into the air through soil respiration, and only a small fraction enters long-term storage, subject to potential loss through leaching, which may end up in drainage systems³. Depending on the intensity of anthropogenic emissions and extent of green spaces and trees characteristics, studies reveal that urban vegetation can offset a small fraction of CO₂ emissions, and this is reliant on management of gardening waste, and incineration processes that can nullify carbon gains^{4 5 6}.

Skyrise greenery may require intensive maintenance and irrigation, involve increased energy consumption, and higher indirect CO₂ emissions. Furthermore, plant accommodation modifications in building design produce indirect CO₂ emissions since more concrete and cement are required, resulting in additional emissions. While urban vegetation may offset some CO₂ emissions, soil respiration and maintenance-related indirect emissions pose challenges, therefore understanding its limitations for climate mitigation is crucial. While plants filter pollutants, empirical evidence on their consistent service needs to be further developed⁷. Instead, they can enhance the thermal environment, if they are well-planned to consider their impact on microclimates and airflow in diverse urban settings⁸. Urban designers should acknowledge these limitations while recognizing the potential of urban greenery in enhancing thermal comfort.

Chon: Historically, landscape architects gathered data on urban thermal environments for planning and design, whereas the understanding of climate change mechanisms was in the realm of climate scientists. Spatial techniques like Geographic Information Systems (GIS) have been utilized by most landscape architects to analyze thermal vulnerability or propose land cover alterations, banking on the belief that green spaces can affect temperatures. However, this method lacks the biophysical understanding of how green spaces mitigate heat. In recent times, advanced models like ENVI-met, rooted in computation fluid dynamics and thermodynamics, have gained prominence in landscape architecture⁹. ENVI-met allows analysis of urban green spaces’ heat mitigation capabilities by simulating ecological processes and microclimate mechanisms¹⁰. Its system includes soil models, vegetation, and artificial ground, aiding in understanding heat reduction mechanisms and facilitating the application of green infrastructure in research and practice^{11 12}.

Jim: This issue highlights the persistent gap between scientific research and practical application. Scientific studies have produced a wealth of findings applicable across various urban and green space factors, encompassing climatic zones, city characteristics, venue types, vegetation attributes, and more, impacting cooling services and effects. However, the complexity of these variables, their temporal variations, and conflicting study outcomes pose challenges for climate scientists, let alone practitioners in other fields¹³. The knowledge is dispersed across numerous academic papers and reports, necessitating a cohesive and accessible synthesis for non-specialists.

It’s crucial to translate this extensive research into understandable language and actionable guidelines for landscape practitioners. Collaboration between science and practice is pivotal for knowledge synthesis, translation, and application. Landscape designers, while having access to this knowledge, might require support in comprehending and utilizing scientific findings effectively. To bridge this gap, designers need to enhance their understanding of scientific concepts, fostering better communication with scientists. Simultaneously, scientists should grasp landscape design needs, facilitating the adaptation of research findings into tailored applications for climate change mitigation. Collaborative efforts and improved communication between these domains are imperative to address this challenge effectively.

Q2. Landscape architecture has been incorporated in the implementation of green infrastructure on larger scales, especially in landscape planning. Nonetheless, the responsibility for these endeavors has conventionally rested with engineers, developers, and urban planners. As we find ourselves in an era where green infrastructure stands as a fundamental facet of urban development, what obstacles and prospects should landscape researchers and planners bear in mind to ensure that they remain integral participants in this era of carbon-conscious initiatives?

Velasco: Landscape architects need to consider the limitations of urban vegetation in mitigating CO₂ emissions due to its limited coverage relative to the magnitude of anthropogenic emissions. Understanding the spatial and temporal scales at which urban greenery operates is crucial for its effectiveness in benefiting the local and regional environment. While vegetation at larger scales offers various benefits, some, like air purification and carbon offsetting, requires reforestation initiatives beyond city limits. Carefully planned strategies are necessary to ensure the long-term survival of trees in such large-scale reforestation efforts. Rather than relying solely on urban greenery for climate change mitigation, landscape architects should focus on its adaptation benefits. They must avoid overstating its capacity to clean the air and offset emissions, recognizing that these services are more effectively provided by natural forests. Proposing innovative designs integrating vegetation should be rooted in scientific evidence, not just good intentions.

While acknowledging the proven benefits of greenery on public health and well-being, it is crucial to avoid oversimplifying issues, such as trees’ ability to solve all environmental problems. Green architecture should also not be used as an excuse for inaction regarding greenhouse gas reduction.

Chon: The historical dominance of engineers, developers, and urban planners in shaping urban areas resulted in traditional infrastructure. This tends to place landscape architects on the sideline despite green infrastructure falling within their domain. However, the global focus on sustainability, exemplified by initiatives like the ‘UN Climate Summit,’ aims to achieve carbon neutrality by 2050, prompts a shift toward multifunctional green infrastructure. In South Korea, the government’s comprehensive plans, including the ‘2050 Carbon Neutrality Scenario’ and ‘Carbon Neutrality and Green Growth Promotion Strategy,’ emphasize restoring carbon sinks like forests and urban spaces, and highlight the vital role of landscape architects in planning, designing, and managing these areas for carbon neutrality. Coastal areas, abundant in blue carbon resources like mangroves and salt marshes, underscore the expanding role of landscape professionals in mitigating carbon emissions, especially in South Korea which is surrounded by extensive coastal landscapes. As these spaces play a crucial role in global carbon initiatives, landscape researchers and planners foresee a growing opportunity to contribute significantly in both green and blue carbon contexts.

Jim: Improving urban green spaces covers the comprehensive enhancement in their quality, quantity, diversity, spatial arrangement, and integration within city landscapes. This enhancement demands a profound integration of scientific expertise, involving urban ecologists and horticulturists, to elevate the design of urban infrastructure significantly. The predominant reliance on gray infrastructure presents a major challenge in advancing green infrastructure planning, necessitating collaborative efforts from a cohesive team of professionals including landscape architects, urban ecologists, horticulturists, and urban planners. Integrating nature into urban settings remains a key objective, demanding a focus on understanding and implementing spatial patterns and connectivity within green spaces. Greater emphasis on spatial ecological planning principles and awareness of green infrastructure’s crucial role in nature-based solutions, climate mitigation, sustainable development, and urban quality of life is essential. It’s imperative to shift away from considering green infrastructure as secondary to gray infrastructure and to mainstream its incorporation intelligently and deliberately into urban development practices.

Q3. Over the past decade, various facets of landscape architecture have transcended the boundaries of conventional greening practices. From your perspective, which ground breaking technologies and techniques hold the potential not only to substitute but also to surpass traditional methods in the analysis and design of urban green spaces?

Velasco: Understanding the biogeochemical cycles and the local climate in an urban ecosystem is essential for determining the value of greening practices in terms of climate change mitigation and adaptation. This is probably more crucial than developing revolutionary tools and methods. We are only now starting to understand how plants and soil respond to urbanization in a changing climate. There are still a lot of unanswered questions that urban ecologists, biologists, atmospheric scientists, and landscape researchers should be able to address in the coming years.

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We are only now starting to understand how plants and soil respond to urbanization in a changing climate.

Chon: In landscape architecture, information gathering traditionally encompassed human, social, and environmental factors through various means like documents, direct interactions, and data analysis. The advent of computer science introduced GIS extensively, and with the rise of digital technologies in the Fourth Industrial Revolution, methods like Building Information Modelling (BIM), virtual reality, and augmented reality are being widely applied in landscape planning and design processes. The scalability of Internet of Things (IoT) and Big Data offers vast potential. IoT automates data collection from natural environments while Big Data utilizes programming languages like Python and R to amass spatial and social information, leveraging social media platforms for experiences about outdoor spaces. These data, when merged with machine learning algorithms, can analyze preferences and environmental traits. Moreover, Augmented Reality, Virtual Reality, Digital Twin, and Metaverse platforms enable the creation of meaningful 3D environments, integrating information for simulating complex scenarios, predicting future landscapes, and addressing challenges like climate change and biodiversity shifts.

Jim: Recent advancements in landscaping technologies present significant opportunities to enhance urban greening efforts. Innovations in roof greening materials and techniques have notably expanded the availability of green spaces on buildings’ rooftops, addressing the scarcity of ground-level space for greenery, particularly in compact cities. Improved green wall technologies have complemented these advancements, extending green coverage across cities in three-dimensional spaces. This innovation utilizes building envelope resources that would otherwise remain underutilized, offering a practical solution to densely populated areas that lack greenery. Additionally, recent research on urban soil and its impact on tree growth holds promise for improving urban forestry practices. Scientific insights into soil limitations affecting tree health and growth due to insularity and compaction offer comprehensive solutions that landscaping professionals can integrate into their work to enhance urban tree performance and stability.

Q4. Do recent developments in global sustainability, including policies (such as EU Taxonomy, CSRD, EPBD), financial mechanisms, technologies, and reporting frameworks (like SBTi, GRESB, TCFD, REDD+), truly empower landscape architects? Can these resources effectively influence decision-making, and how can landscape architects integrate them seamlessly into political, financial, and economic sectors? Are there constructive criticisms or concerns that could improve decision-making processes? Lastly, to what extent should landscape architects expand their knowledge boundaries to navigate this evolving sustainability landscape?

Velasco: Landscapes architects should use these tools with care. They can provide some insight, but cannot be the sole basis for decisions. Platforms such as i-Tree (<https://www.itreetools.org/>) can help to quantify the environmental benefits that urban trees provide, but we must be cautious when using their output. This tool, similar to others, was developed using the relatively limited information on urban tree processes available at the time, which may not be fully representative in some cases, such as for trees in tropical cities. This does not prevent their use, but users should be aware that the uncertainties in the outcomes may be significant.

Chon: The landscape architecture field is experiencing a significant impact from global sustainability and resilience trends. This is particularly evident in Korea’s response - we see initiatives like K-SDGs (Korea Sustainable Development Goals) and proposals for Resilience and K-Taxonomy that focused on climate change and carbon neutrality. This expansion into finance, technology, and policy realms presents diverse options for designers, emphasizing the necessity of Nature-based Solutions (NbS). NbS offer efficient solutions to societal challenges by leveraging natural infrastructure, offering economic, social, and environmental benefits. K-Taxonomy, facilitating eco-friendly activities like NbS, supports green financial investments, fostering connections among landscape planning, technology, finance, and policies. To navigate this, landscape architects must broaden their knowledge base through interdisciplinary approaches, extending beyond local environments to understand connections with finance, technology, policies, and global trends, necessitating holistic and multidisciplinary thinking.

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Understanding the biogeochemical cycles and the local climate in an urban ecosystem is essential for determining the value of greening practices in terms of climate change mitigation and adaptation.

Jim: The emergence of modern and powerful tools can significantly foster the work of landscape professionals’ contributions to enhancing green infrastructure. It will help if more landscape designers adopt such new tools and are encouraged to proactively acquire the necessary knowledge and skills to modify their practice. Advocacy of the new techniques could be boosted by organizing training sessions, seminars, and workshops. The government or professional bodies can consider requiring the use of new landscape planning and decision-making tools.

Q5. As landscape architects increasingly adopt a more measurable and quantifiable approach, do you foresee potential hurdles in collaborating with other disciplines? If challenges emerge, what effective strategies can be implemented to foster integration within the broader Architectural, Engineering, and Construction (AEC) industries?

Velasco: As an atmospheric scientist who has worked with people from various professional backgrounds to solve air pollution and urban warming problems, I feel that some professionals may not be overly concerned with certain scientific facts, especially with those that contradict their artistic visions. There are also those who dislike field work. Unfortunately, it is becoming common practice to apply models and tools like those mentioned in the previous question to validate assumptions about the environmental benefits provided by urban greenery without any corroborating field or laboratory work. Furthermore, we are seeing a substantial increase in assessments based on automated approaches to analyze big datasets. The current interest in big data and machine learning, fuelled by the ease with which digitized data can be obtained nowadays, has led to some believing that conclusion may be drawn without substantial theoretical background in the field. This revolutionary trend of theory-free science is highly seductive to experts in informatics and visualization techniques, but without a solid grounding on the topic¹⁴. Landscape architects must resist the temptation to follow this trend.

They must accept that both field observations and numerical modelling are required to determine effective solutions to improve the urban environment. I always encourage young researchers and practitioners to leave the comfort of their air-conditioned office, go out into the field, sweat a little, collect reliable data, and then run models to evaluate the effectiveness of potential new urban landscapes.

Chon: In Korea, through public datasets and open APIs, everything from human and social data such as population and land use to data related to the natural environment such as air, soil, and water quality are effectively constructed at the government level. However, if collaboration with other fields is necessary in the process of managing or technologically applying such data, an integrated approach and strategy may be required. These technologies and techniques hold the potential not only to substitute but also to surpass traditional methods in the analysis and design of our outdoor spaces. Because the landscape architecture field is actively using AI, Digital Twin, and BIM, just like in the existing AEC (Architectural, Engineering, and Construction) industry, landscape researchers and designers also need to advance their knowledge. Without an understanding of the trends in software and management practices that are actively being utilized within the AEC industry, landscape architects will not be able to effectively integrate them. Additionally, for effective integration, it is necessary to apply a decision-making process such as adaptive management. Adaptive management is a core principle of resilience-based management. It is a necessary process for a system to become adaptive under the resilience concept and provides an opportunity to apply flexible decision-making strategies to respond to disturbances or uncertainties. Adaptive management has the advantage of integrating various systems and learning continually to improve them in the long term¹⁵. Therefore, it is possible to effectively establish an iterative learning process for collaboration with architecture, engineering, and construction fields during the data collection, analysis, planning, and design process.

Jim: Developing measurable or quantifiable metrics may facilitate objective planning and judging of the deliverables, specifically to meet planting standards. However, the crux of landscape design remains principally and fundamentally a quality issue that any measure of quantification cannot substitute¹⁶. The differences between strands of urban development professions are due to deeply-seated structural problems that defy easy solutions. True to human nature, the tendency to specialize has engendered the corollary inclination to diverge and compartmentalize, creating silos and obstacles to effective communication and hybridization of ideas and practices. To bridge the glaring gaps between professions, we need to nurture a crop of champions with the penchant to traverse professions and facilitate communication and cooperation to generate cohesion and convergence. This process will take plenty of bold effort and time. We better trigger the process as soon as possible.

Q6. Amidst the evolving carbon market, what distinctive landscape policies and frameworks are in place within the contexts of Hong Kong (or China), Korea, and Singapore, that empower their educational institutions and professional sectors to respond to design green infrastructure for this shifting landscape?

Velasco: Singapore is renowned for seamlessly blending greenery into its urban landscape, epitomized by its moniker, ‘City in a Garden’, now ‘City in Nature’. The efforts and achievements in this realm set a commendable example for other cities aspiring to enhance their green spaces. The Singapore Green Plan 2030 outlines ambitious goals to further augment greenery, emphasizing collaborative efforts between the government and the community. This strategic initiative focuses on extending Singapore’s natural capital, intensifying green spaces, restoring nature into urban areas, and enhancing connectivity within Singapore’s green spaces. Visible progress is evident in these strategies, buoyed by increasing community engagement and a growing acknowledgment that individuals are integral parts of the environment.

This shift represents a significant departure from compliance-driven actions toward self-motivated participation in environmental initiatives. In the domain of urban greenery, authorities exhibit responsiveness and willingness to heed expert advice. Engagements with authorities have successfully influenced perspectives on urban vegetation’s limitations, dissuading the use of narratives suggesting its capacity to offset CO₂ emissions. Similarly, authorities also take into account the preferences of the community. However, academia may not mirror this proactive stance yet. Despite supporting studies on urban vegetation, the focus primarily revolves around producing scientific papers for academic merit and monetizing the services provided by trees, often relying on numerical simulations and remote sensing data. There’s a lack of emphasis on understanding the fundamental processes governing the benefits of urban vegetation, exacerbated by a decline in field and laboratory work due to an inclination to desktop studies and changes in academic programs. This trend poses a threat to the development of integrated urban landscapes that incorporate vegetation effectively.

Chon: In Korea, a proactive stance towards carbon neutrality is evident in the establishment of landscape policies and frameworks. Government ministries, including Education, Environment, Oceans and Fisheries, the Korea Forest Service, and the Korea Meteorological Administration, collaborated to create educational materials on climate crisis, ecological transition, and carbon neutrality. They also selected specific schools to act as regional centers for practicing carbon neutrality. Green infrastructure, crucial for achieving carbon neutrality, holds a central position in Korean settlement policies. National-level emission absorption factors are being developed, and measures to calculate losses and emissions are being instituted. The proposal for a ‘green infrastructure comprehensive plan’ seeks to enhance the active application of green infrastructure across cities. Moreover, Korea is considering additional carbon-related standards alongside existing park area and accessibility criteria for parks and green spaces. This concerted effort integrates green infrastructure into education and policy, aligning it with carbon-related objectives.

Furthermore, educational initiatives like the BrainKorea (BK) 21 project, supported by the National Research Foundation, focus on enhancing research competitiveness, fostering skilled personnel, and improving education quality. Through collaborations with universities and projects such as Eco-Up Innovation Convergence University, Korea actively supports research and design capabilities in landscape architecture, specifically addressing global issues like carbon neutrality and climate change.

Jim: Hong Kong initiated its exploration of carbon market prospects by conducting a preliminary feasibility assessment in March 2022, jointly led by government departments, Hong Kong Exchanges and Clearing Limited (HKEX), and the Securities and Futures Commission¹⁷. This effort established the Green and Sustainable Finance Cross-Agency Steering Group Carbon Market Workstream (CASG) to probe the potential for several key initiatives:

- 1) Establishing Hong Kong as a global Voluntary Carbon Market (VCM), leveraging its international standards status and financial prowess;
- 2) Collaborating with stakeholders to align with Mainland policies and create the Greater Bay Area (GBA) Unified Carbon Market;
- 3) Recognizing compliance markets like the EU Emissions Trading System (EU ETS) and their role in allowing market participants to trade emission allowances; and
- 4) Noting that while ETSSs cover only around 16% of global emissions, the VCM can serve as a starting point for corporations not covered by enabling them to neutralize emissions and direct capital towards carbon credit-generating projects.

Following this, HKEX launched the Hong Kong International Carbon Market Council in July 2022, collaborating with corporate and financial institutions to explore regional carbon trading opportunities¹⁸. The objectives are to leverage Hong Kong’s financial prominence, contribute to carbon neutrality, foster green finance ecosystems in Hong Kong, Mainland China, and beyond, ultimately aiming to establish Hong Kong as a premier carbon hub in Asia and globally while aiding efforts towards a low-carbon economy.

Q7: Reflecting on the past decade, it’s evident that the next 10 years are poised for remarkable growth in the realm of green infrastructure as a response to climate change within landscape architecture. As we anticipate this unfolding frontier, which aspects do you consider most vital for both academics and professionals in the upcoming decade, and what underpins their significance?

Velasco: Globally, cities have launched expansive green infrastructure projects to combat urban warming and address climate change, with more initiatives underway. However, some of these efforts prioritize urban greenery may be based on emotional appeal rather than scientific foundations. While acknowledging the advantages of greenery—improved public health, societal well-being, and resilient communities—embracing reforestation programs is crucial. For instance, the widespread use of vegetation on city walls and roofs, while enhancing aesthetics and offering some communal benefits, might have less impact on local climates, air quality, and greenhouse gas emissions compared to ground-level vegetation, especially planting large trees. When proposing designs with greenery on roofs and walls, architect must balance potential benefits against drawbacks like indirect greenhouse gas emissions during construction, maintenance costs, and redirecting resources towards broader initiatives that expand urban greenery on a larger scale. This evidence-based approach requires collaboration with experts in urban ecology, climatology, and social sciences to ensure green infrastructure projects genuinely benefit society rather than serving as mere greenwashing.

Chon: Since the emergence of sustainability concepts from the seminal work ‘The Limits to Growth’ in 1972, it has been globally utilized to address multifaceted challenges, notably climate change. However, persistent environmental issues like natural disasters and biodiversity loss underscore the limitations of current methodologies. Sustainability seeks to harmonize economic growth, environmental preservation, and social welfare. Within green infrastructure and landscape architecture, the pivotal practical concept is ‘resilience,’ denoting a system’s capacity to withstand and adapt to external disruptions.

Initially rooted in ecology in 1973, resilience has extended across disciplines, encompassing landscape architecture. Recognizing green infrastructure as an ecosystem providing essential human benefits, within the resilience framework, emphasizes an integrated social-ecological system where maintaining or enhancing resilience is essential for continual provision of ecosystem services. It’s crucial to apply the resilience concept not only in research but also in landscape planning and design to address climate change impacts effectively. This coupling of resilience with sustainability emerges as a vital approach to navigate human-induced challenges in the coming years.

Jim: There’s immense potential for enhancing green infrastructure design through up-to-date research insights, addressing key concerns at macro and micro scales. At the macro level, leveraging landscape ecology concepts can optimize spatial patterns, while incorporating greenways and blueways can enhance urban connectivity for both people and wildlife. Connecting urban and peri-urban green spaces with natural areas can facilitate ecological interflow, even using stepping-stone sites where continuous green space is not feasible. At the micro level, addressing socio-economic inequalities in green space provision and access is crucial. Designing socially inclusive green spaces to encourage interactions and providing walkable access to most urban residents are pivotal. Enhanced canopy cover for effective cooling, utilization of native and diverse plant species, as well as diverse vegetation types can maximize biodiversity. Integrating skyrise greenery, encouraging private developers’ participation in public-private partnerships, and engaging citizens in planning and design phases are imperative. In new urban developments and renewal projects, optimizing spatial ecological planning is vital, avoiding dense, nature-deficient urban forms that exacerbate the urban heat island effect, and revitalizing town plans for greener, more sustainable urban spaces.

The responses cover a broad range of perspectives on urban green spaces, climate change mitigation, interdisciplinary collaboration, landscape policies, and evolving trends within the field of landscape architecture. It delves into the complexities and challenges faced by professionals, researchers, and policymakers while emphasizing the need for a multidisciplinary approach to address these issues effectively.

First, responses address the collaboration and knowledge exchange needed between diverse fields like landscape architecture, urban planning, and environmental and atmospheric sciences. This approach acknowledges the necessity for interdisciplinary efforts in tackling climate change and enhancing urban green spaces. Second, they highlight the challenges in collaboration between professions, especially regarding differences in perspectives, reliance on models without fieldwork, and the need for a balance between theory and practical experience. Third, it acknowledges the importance of integrating technological advancements and findings on urban ecology and biogeochemical cycles into landscape architecture practices, and emphasizes the necessity for landscape architects to stay updated on software trends used in the broader AEC industry. Fourth, it provides insights into specific regional policies and frameworks in Hong Kong, Singapore, Korea highlighting their efforts to address climate change through green infrastructure and educational initiatives. Fifth, it discusses future trends and considerations in the field of landscape architecture, including the significance of resilience, social inclusivity in green space design, and the necessity for evidence-based approaches in green infrastructure projects. Lastly, it critically evaluates the impact of green infrastructure initiatives, emphasizing the need for evidence-based decisions, especially regarding the effectiveness of urban greenery in responding climate change over time.

ABOUT THE INTERVIEWEES

ERIK VELASCO investigates the impact of urbanization and climate change on the atmospheric environment and biogeochemical cycles, and the conjuncture of these with the construction of sustainable, equitable and inclusive cities. He is interested in understanding the interactions between the urban ecosystem and its atmosphere as a means to devise effective solutions to improve air quality, mitigate climate change, and create cooler and greener microenvironments. He has conducted research in Asia and North America, but his main laboratories have been Singapore and Mexico City. He currently collaborates with the Molina Center for Energy and the Environment.

C.Y. JIM is Research Chair Professor at the Education University of Hong Kong, and formerly Chair Professor at the University of Hong Kong. His research covers the conservation, creation, and refinement of nature-in-city, encompassing urban ecology, urban forestry, urban soil science, and nature-based solutions for sustainable cities. He is ranked first among 30,711 forestry researchers by the Stanford University study in 2023.

JINHYUNG CHON is a professor at Korea University’s Division of Environmental Science and Ecological Engineering, specializes in planning resilient ecological landscapes. His expertise lies in designing sustainable solutions that integrate climate change adaptation, emphasizing the strong connection between humans and nature as a single social-ecological system.

FOOTNOTES

¹ <https://www.unep.org/news-and-stories/press-release/co2-emissions-buildings-and-construction-hit-new-high-leaving-sector>

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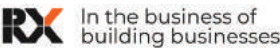
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About IFLA APR

The International Federation of Landscape Architects (IFLA) is the global voice of landscape architecture, championing the profession and its vital role in shaping our environment. The IFLA Asia Pacific Region (IFLA APR) is a key sub-group dedicated to fostering collaboration, innovation, and excellence in landscape architecture across the Asia Pacific.

Join the IFLA APR Community

Become a member today and unlock a world of opportunities. Enjoy exclusive activities, events, and the chance to connect with a dynamic community of landscape architects. Don't miss out—scan the QR code below to sign up now!



EXCITING NEWS: IFLA APR JOB BOARD LAUNCH

We are thrilled to announce the launch of the IFLA APR Job Board! This new portal is designed to bridge the gap between top companies in the landscape industry and talented professionals. Whether you're a company seeking to attract and retain top talent or a professional looking to advance your career, scan the QR code below to explore our job board today!



SAVE THE DATE: 2024 IFLA APR REGIONAL COUNCIL MEETING AND GALA DINNER

Join us in Singapore for the 2024 IFLA APR Regional Council Meeting and Gala Dinner! This event will feature engaging forums and insightful site visits. Register your interest and stay updated by scanning the QR code below to subscribe to our newsletter.



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