





1. 曼谷都市森林公园鸟瞰图
1. Aerial view of the Metro-forest Project

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应对城市问题的本土设计 ——曼谷都市森林公园

LOCAL DESIGN RESPONDING TO URBAN PROBLEMS — THE METRO-FOREST PROJECT, BANGKOK

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随着城市化进程的急剧推进，全球城市活动释放的二氧化碳总量正在以惊人的速度不断增加。此外，垃圾处理、水污染和大气污染等问题也使我们的生活环境进一步恶化。地球上的每个成员都应为此负责，而作为环境设计者的景观设计师，通过运用包括低影响开发（LID）在内的生态友好型设计策略，可以在很大程度上缓解这些问题。作为缓解城市问题的另一个重要工具，“都市森林”概念自提出以来已有数十年，但其在曼谷的实践却相当有限。因此，曼谷都市森林公园项目意在通过对一处面积约为2hm²的重要地块加以改造，结合在当地有着悠久种植历史的低地热带树种的种植，将这里重塑为一个可应对城市扩张、城市热岛效应以及洪水频发等问题的都市森林景观典范。

项目背景

为响应泰国石油管理局（PTT）增加全国森林面积的倡议，同时纪念泰国王室，特别是玛哈·扎克里·诗琳通公主为保护森林所付出的努力，一个旨在反映曼谷昔日景观的都市森林公园项目获准规划建设。该项目位于曼谷东部边缘一处缺乏规划的郊区——巴威区，距离素万那普国际机场约6km。地块周边分布着中等密度的住宅区及少量商

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摘要

曼谷都市森林项目旨在反映曼谷昔日的景观、应对各种城市问题，并增加城市森林面积。该项目在优先选择传统乡土树种的同时，采用宫脇生态造林法，以创造多样性的森林生态环境并促进植物生长。此外，设计团队对各种树种的布局以及栽植密度也进行了精心安排。空中步道和观景台的设计不仅可以在森林演替的初期最大程度地减少游人对迅速生长的树林的干扰，也使人们有机会近距离欣赏成熟的林冠之美。通过对曼谷本地设计语言的巧妙运用，这里成为了一处真正能够唤醒公众环境保护及城市森林意识的公共空间。

关键词

城市森林；乡土树种；树种演替；林冠；教育

ABSTRACT

To respond to the urban problems and to increase forest areas in the city, an urban forest reflecting Bangkok's former landscape was designed and constructed. To create diverse forest ecology and stimulate plant growth, Miyawaki's ecological method to reforestation was implemented, and local tree species were used for pioneer planting as they had once established territorial populations around Bangkok. The layout of the species was carefully grouped, and planting locations were also carefully selected. The skywalk and observation tower were designed to minimize disturbance of the burgeoning forest and allow close-up views of the maturing canopy. This project is distinguished by strong design gestures that are well integrated into the landscape by using Bangkok's design language, creating a space truly to inspire public awareness of urban forestry and the importance of environmental stewardship in Thailand.

KEY WORDS

Urban Forest; Local Tree Species; Succession of Tree Species; Canopy; Education

整理 田晓劫 王颖

译 黄廷峰

EDITED BY Xiaojie TIAN Ying WANG

TRANSLATED BY Yanfeng HUANG

项目地址：

泰国曼谷市巴威区

项目面积：

2hm²

项目委托：

泰国石油管理局

项目合作：

生态林顾问——Sirin Kaewlaierd博士
景观设计顾问——Angsana Boonyobhas博士
建筑设计/室内设计——Spacetime建筑事务所
小剧场内部设计——designLAB NLSS工作室
灯光顾问——LD49灯光设计公司
结构工程——H. Engineer工程咨询公司
机电工程——MITR技术咨询公司

首席设计师：

Tawatchai Kobkaikit

项目团队：

Nantawan Sirisup、Akachai Werakulchai、
Punyada Klinpaka、Hatacha Sukprakob、Tiprada
Tingklub、Thannaphat Tonnuea

设计时间：

2012年10月~2013年9月

建成时间：

2015年5月

所获奖项：

2016ASLA综合设计类荣誉奖
2016TALA景观艺术/展览类卓越奖
2017IFLA亚太区公园与开放空间设计类卓越奖

LOCATION:

Prawet District, Bangkok, Thailand

AREA (SIZE):

2 hm²

CLIENT:

Petroleum Authority of Thailand

COLLABORATORS:

Ecological Forest Consultant — Dr. Sirin Kaewlaierd
Landscape Design Advisor — Dr. Angsana Boonyobhas
Architectural Design / Interior Design — Spacetime
Architects
Interior Design of Mini-Theatre area — designLAB NLSS
Lighting Consultant — LD49
Structural Engineering — H. Engineer
MEP Engineering — MITR

CHIEF DESIGNER:

Tawatchai Kobkaikit

PROJECT TEAM:

Nantawan Sirisup, Akachai Werakulchai, Punyada
Klinpaka, Hatacha Sukprakob, Tiprada Tingklub,
Thannaphat Tonnuea

DESIGN PERIOD:

October 2012 – September 2013

COMPLETION TIME:

May 2015

AWARDS:

2016 ASLA Professional Honor Award in General Design
Category
2016 TALA Professional Excellence Award in Landscape
Art / Exhibition Category
2017 IFLA ASIA-PAC LA Award of Excellence in Parks and
Open Space Category

- ① 官肋生态造林法基于潜在植被理论和演替理论而提出，强调并提倡使用乡土树种建造乡土森林，以在较短时间内建立适应当地气候、带有浓密冠层的群落结构。

业区，由于管理不善，其外围已布满生活垃圾。此外，由于整个区域地处低洼地带，属于易涝区，因此承担着为曼谷东部地区滞蓄洪水的职能。

2012年初，PTT造林部门委托设计团队在场地中建造一座都市森林公园，以实现该区域的生态重建，并为培养公众环保意识、促进游客了解当地森林生态提供一个户外展示空间。在包括现场勘察和分析在内的初期阶段，设计团队对区域内的土壤和水体进行了检测，结果表明当地黏性土含盐量普遍较低，而地下水则大多属于高水位咸水，这极不利于植物生长和重新造林。因此，设计在种植区内采用了坡地形式，以避免整个场地范围内的土方工程。除了为植物生长提供条件外，这些人工土坡如同可以吸收湿气和水分的海绵，既有利于场地通风，又使得场地免受周边环境的侵扰。由于耐盐植物和龙脑

香科低地植物一度在拉玛三世和拉玛四世时期（19世纪中期）遍布曼谷周边，甚至很多地区都以它们来命名，因此这些树种的幼苗被优先选种在场地内，以再现曼谷昔日的氛围。

都市森林公园于2013年5月开始建造，大约37 000m³的土壤被引入以塑造起伏的坡地，从而在相对狭小的空间内创造出多样的微生态环境；其上覆盖6 000m³适于作为种植介质的优质种植土，可用于进一步塑造地形。

树种演替：方法与技术

为了创造多样性的森林生态环境并促进植物生长，该项目采用了官肋生态造林法^①，以为多种植物创造理想的生长环境。通过景观设计师、森林生态学家和承包商的合作设计及建造，

项目塑造了多个土质松软的坡地。同时，由三份表层土、一份生稻壳、一份椰糠、一份鸡粪混合均匀制成的高肥力有机土壤被用作适宜低地树种幼苗生长的土壤培养基。此外，根据植被的演替速率和灌溉水源条件，设计团队对各种植物细加布局。例如，沿堤种植榄李（*Lumnitzera racemosa*）等耐盐耐湿的树种，在河滩两侧种植能够经受短时间雨水浸泡的树种，而落叶树和龙脑香科低地植物，如具翼龙脑香（*Dipterocarpus alatus*）和香坡垒（*Hopea odorata*），则被栽种在坡地之上。

全园75%的土地种植了共计6万余株树木，其中特有树种超过279种。基于不同植被群落所创造的空间覆盖类型，设计团队对树木的栽种密度也进行了精心安排。例如，将初植幼苗按照每平方米4株（即间距为50cm）的密度进行种植，以鼓励达尔文“适



1st Month: Prior condition of the abandoned site
第一个月：改造前的场地情况



2nd Month: Initial earthwork of the site
第二个月：场地初始阶段的土方工程



4th Month: Sculpted berm topped with a 1-meter deep mixed soil
第4个月：塑造出的坡地之上覆盖有一米高的混合土



6th Month: Earthwork completion
第6个月：土方工程完工



7th Month: Berm planting ceremony
第7个月：种植阶段启动仪式



19th Month: A full year grown forest
第19个月：一年后森林的生长情况



32nd Month: Stone terrace work
第32个月：石阶铺设



33rd Month: A full-formed forest in comparison to the newly planted area
第33个月：河岸左侧完全成形的林区和右侧新种植区的对比



38th Month: A demonstrative forest of rich foliage and texture was formed 3 years after the project.
第38个月：三年之后，一片植被丰富的展示林已经形成。

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2. 项目施工过程 2. Construction sequence of the project

者生存”的自然选择过程。此外，通过在一个群落内选择不同高度的树种，可以创造出如同天然森林一般多层次的林冠层。

过去5年中，已有相关数据证实，宫肋生态造林法在PTT的许多石油库和天然气库保护带项目中取得了巨大成功。研究发现，种植的幼苗通常在第一年增高三倍，在第二年和第三年分别再增高一倍，三年之后，树木已经高大到无法测量其高度；虽然速率放缓，但仍可以观察到树木在不断生长，林冠密度亦明显增大，森林气候逐渐形成。研究

还发现，宫肋生态造林法的成本是其他造林法的十分之一；运用该方法培育的森林生长10年所形成的状态，普通森林需生长30年才能达到。通过预测树木的增长速率，曼谷都市森林公园项目推算出空中步道和观景台的高度。在不久的将来，部分空中步道将被林冠遮盖，为游人提供漫步于林冠层之下的体验。

秉持“无为而治”的理念，都市森林公园寻求实现森林的自管理。通过定期收集公园内植物的生长数据，研究发现树木的生长速度符合预期。随着森林逐渐成熟，许多

小动物会被吸引到此地，从而丰富当地物种的多样性，并为该项目建立起全新的生态系统。随着未来植物群落的不断演替，人们将会在这里看到更加丰富的生物多样性。

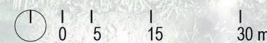
林冠视角下的城市森林

众所周知，天然森林有着浓密的林冠层，包含树枝、树叶、花朵和果实等。适宜的林冠郁闭度对于控制森林环境、营造森林气候、展现其对于城市环境的有益功能至关



Legend 图例

- | | | |
|--------------------------|---------------------------------|---------------------------|
| 1. Public Road 公共道路 | 8. Building Entrance 建筑入口 | 15. Stream 溪流 |
| 2. Public sidewalk 公共人行道 | 9. Exhibition Building 展览馆 | 16. Skywalk 空中步道 |
| 3. Forest Berm 林间坡地 | 10. Roof Garden 屋顶花园 | 17. Observation Tower 观景台 |
| 4. Main Entrance 主入口 | 11. Outdoor Theater Lawn 户外剧场草坪 | 18. Bridge 桥 |
| 5. Guard House 门卫室 | 12. Natural Pond 自然池塘 | 19. Forest Walk 林间步道 |
| 6. Service Road 辅路 | 13. Waterfall 瀑布 | |
| 7. Bicycle Lane 自行车车道 | 14. Weir 堰 | |



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重要。通过密切关注光线、湿度等各项指标，以及对林冠层的保护，景观设计师希望为植物生长创造适宜的微气候，使其不仅适于森林中植被的共生，且有益于周边环境改善。从林冠层的角度看，以最适密度种植并维持这一密度既有利于幼苗的健康生长，也有助于形成良好的林冠截留量，以促进雨水下渗并补给地下水，最终达到零流失标准。当游客在炎炎夏日行走于高悬的空中步道时，蔓延开来的树冠在带给人们丝丝清

凉的同时，也营造出了一种伸手即可触及树冠的、仿佛空中漫步般的浪漫氛围。

土方设计是构建场地全新生态系统的核心，其同时满足该项目众多设计要求，例如通过土方塑造而成的坡地可以利用其间形成的通道对人工瀑布中的渗流进行导流。该方法借鉴了普密蓬国王在其王室造林工程中所采用的灌溉技术，效仿了最简单的自然排水方式，即让水流沿着不同的地形蜿蜒流动，即可为新建林地提供水分。除浇灌功能外，

- 3. 总平面图
- 4. 植被分布图
- 3. Masterplan
- 4. Vegetation distribution diagram

坡地的选址也经过了精心选择，以改善场地通风、防止外来污染、控制视野范围，并利用坡地横断面的高差，栽植不同种类的植被，提升树林及其林冠的美感。景观设计师的空间布景和设计旨在为想要逃离曼谷都市生活，并在树林中度过几小时的游人创造一个“退隐”的森林，为达此目的，控制林冠郁闭度和种植密度至关重要。林冠成熟后，景观设计师还将在地面上辟出小径，以便让游人体验下层植被。公园也会成为动植物新的栖息地，它们在此安家，同时也成为了游人的观赏对象。然而，在森林演替初期，游人的大部分时间可能要在空中步道和观景台上度过，这一设计是为了最大程度地减少游人对迅速生长的树林的干扰，同时也使人们有机会近距离欣赏成熟的林冠之美。

重现空间活力，激发游人兴趣

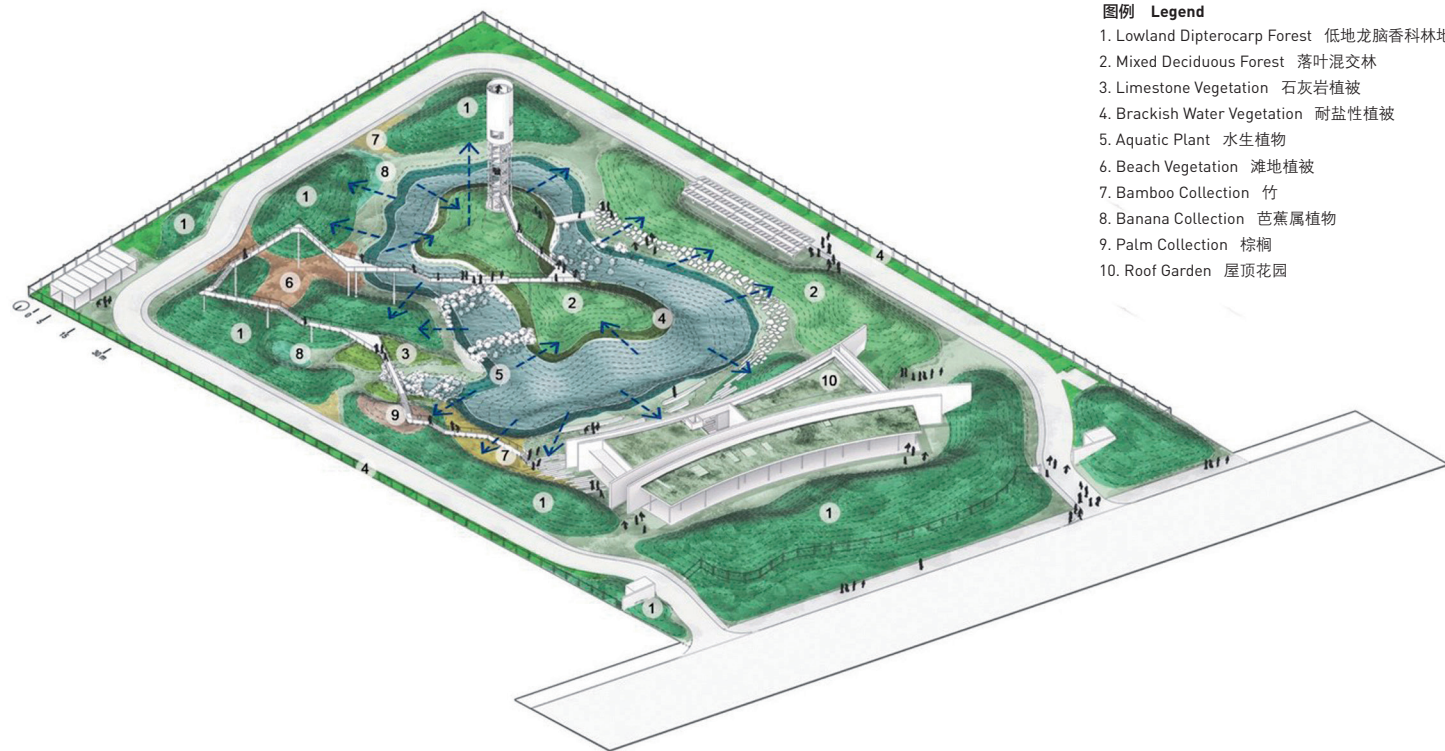
凭借由起伏的坡地塑造而成的瀑布和溪

流景观，空中步道、观景台、树林，以及室内展览馆，都市森林项目获得了LEED-NC铂金级认证。正如当初PTT造林部门所许下的承诺一样，这里成为了一处真正意义上的能够唤醒公众环境保护及城市森林意识的公共空间。由夯实生土打造而成的室内展览空间可向游人普及树木、森林及其生长环境等相关基础知识，展示多种泰国本土森林类型、植物栖息地和地名的关联、PTT造林部门在过去几十年的造林技术汇总，以及对皇家林业项目的说明。

整个森林公园如同室内展览空间的延伸，同样具备展示与教育的功能。随着树木不断地生长演替，区域内的植被越发密集，越来越多的生物聚集于此，游人每次到访似乎都可以获得全新的体验。结合不同的树冠类型、植物群落组成、生态系统和栖息地种类，空中步道沿线的引导标识会对各种植物种类加以说明。通过在地面、空中步道和观景台体验不同层次的树冠，游人将会看到一

个完全不同的曼谷。为了响应不同年龄段游人的需求，PTT造林部门每年定期举办各项活动，如采集种子、制作种植培养基、种子萌发、了解如何植树造林等。此外，活动参与者还会收到树苗作为答谢，并将树苗带回自己家中种植。在这个充满自然野趣的公园中，人们不仅能够获取知识，更能够感受快乐，同时也可以鼓励更多市民在自家后院栽种树苗，创造属于自己的“都市森林”。正如普密蓬国王所述，“只要在人们心中种下一棵树，他们就会种下更多的树、关爱更多的树”——这或许就是该项目取得成功的根本原因。

如今，都市森林公园已对公众开放，游客可邀请PTT造林部门园内工作处的工作人员进行导览解说，或体验在线服务。室内展览馆需要进行日常维护，而依靠大自然的力量进行植被演替的森林区几乎不需要任何人工养护。LAF



图例 Legend

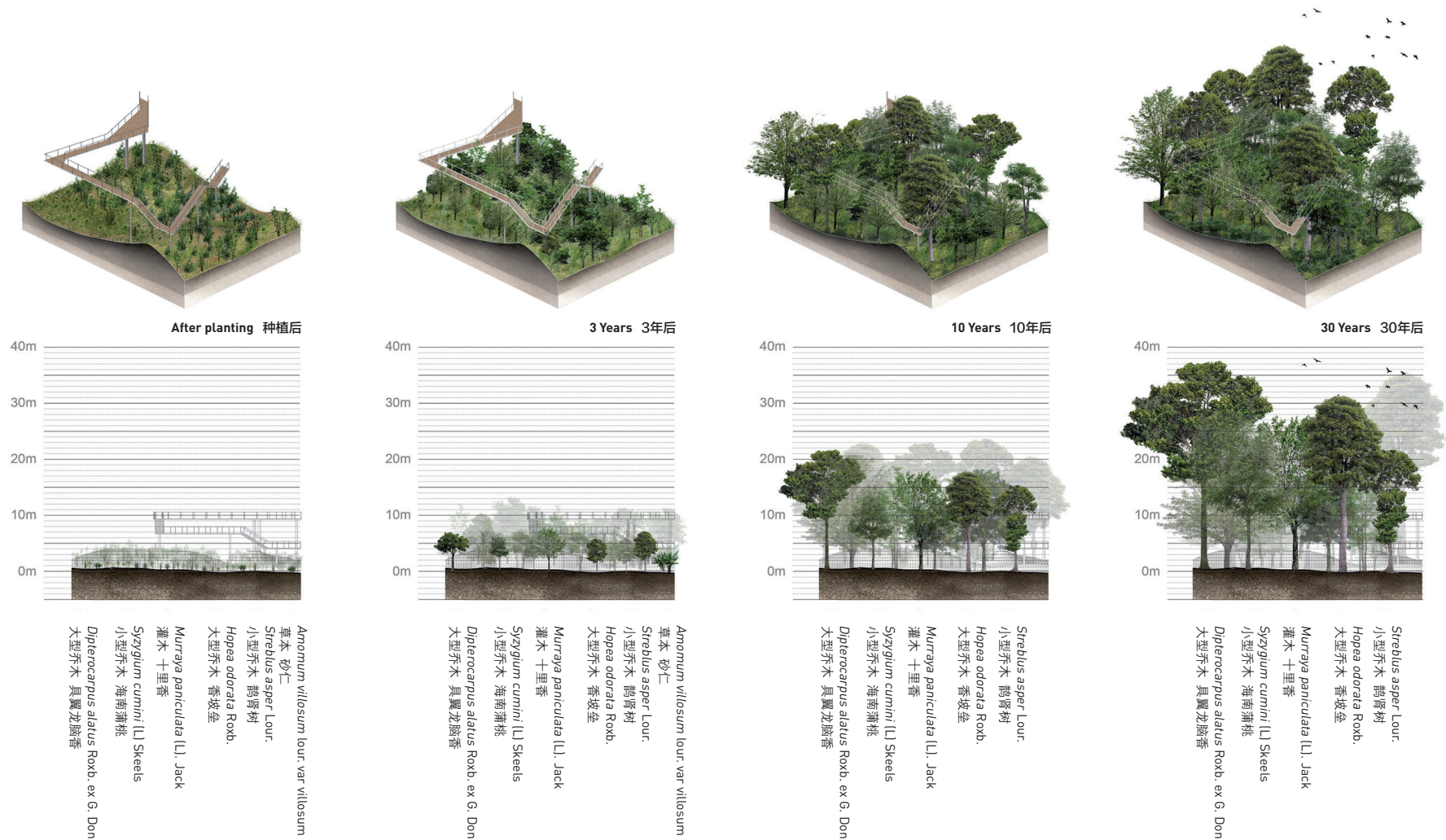
- 1. Lowland Dipterocarp Forest 低地龙脑香科林地
- 2. Mixed Deciduous Forest 落叶混交林
- 3. Limestone Vegetation 石灰岩植被
- 4. Brackish Water Vegetation 耐盐性植被
- 5. Aquatic Plant 水生植物
- 6. Beach Vegetation 滩地植被
- 7. Bamboo Collection 竹
- 8. Banana Collection 芭蕉属植物
- 9. Palm Collection 棕榈
- 10. Roof Garden 屋顶花园

Urbanization plays a major role in creating pollutions in which process the CO₂ released from urban activities is increasing at the alarming rate and has been forecasted to be even higher in the near future. Issues such as garbage disposal management, and polluted water and air are also damaging our living environment. Everyone on this planet is responsible for that, and among whom, landscape architects can substantially contribute to alleviate these problems by utilizing eco-friendly strategies like Low Impact Development. The “urban forest” concept has been introduced a couple of decades ago and has become an important tool to mitigate urban problems, but the practice in Bangkok is rather limited. Therefore, Metro-forest project aims to

reclaim 2-hectare valuable land and reverse the trends of suburban sprawl, urban heat island, and flood-prone developments through the incorporation of historically local (native and introduced) lowland tropical tree species to create an example of utilizing urban forest in landscape design.

Project Context

Under initiatives set by the Petroleum Authority of Thailand (PTT) to increase forest areas for the whole country, and in commemoration of the forest stewardship efforts by the Royal Family and Her Royal Highness, Princess Maha Chakri Sirindhorn, an urban forest reflecting Bangkok’s former landscape was planned. The Metro-forest



project is situated in Prawet district which is a suburban area at eastern fringe of Bangkok, approximately 6 kilometers away from the Suvarnabhumi International Airport. Surrounded by medium density of residential and light commercial areas, this abandoned site showed sign of illegal household garbage disposal scattered at its peripheral. The whole district is located in a lowland and designated as a flood-prone zone protecting flooding of eastern Bangkok areas.

In early 2012, the design team was commissioned by the PTT Reforestation Institute to design an urban forest park for ecological regeneration as well as an outdoor exhibition space to cultivate environmental awareness and educate visitors about local forest ecology. At initial stage of site survey and analysis, soil and water were tested, and it was found that clay soil with slight salinity and high brackish underground water table are normal in this district, but problematic for plant growth and reforestation. Therefore, the raised berm technique was chosen for planting areas to avoid filling and leveling the whole site. In addition to providing condition for plant growth, these created berms were meant to be sponges for absorbing moisture and water, directing ventilation of the site, while buffering outside ambient as well. Saplings of salt tolerant plants species and lowland dipterocarp plant species, which once were prominent during the Rama III and IV era (Mid-19th century), were used for pioneer planting as they had once established territorial populations around Bangkok and many districts were named after the domination of species in the area.

Construction of the Metro-forest Park began in May 2013, where approximately 37,000 m³ of earthwork was introduced to create the engineered berms topped with 6,000 m³ of high quality mixed soil that was suitable for planting medium, and also to



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generate terrain for the new urban forest. In addition, the berms lead to the creation of diverse micro-ecologies in such a relatively small space.

Planting for Succession: Methodologies and Techniques

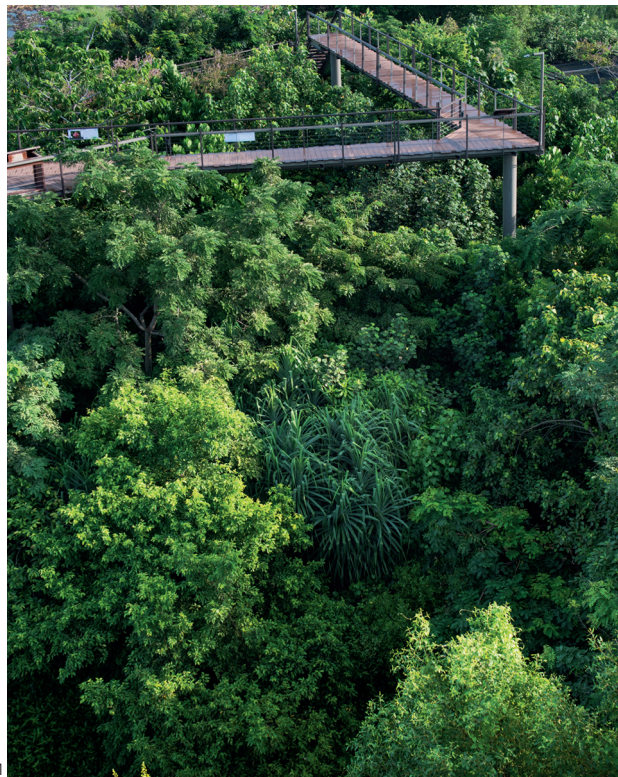
To create diverse forest ecology and stimulate plant growth, Miyawaki's ecological method to reforestation^① was implemented to create optimal growing environments

5. 龙脑香科低地植物的生长演替过程
6. 2016年3月和2017年10月的塘边植物生长情况对比

5. Succession of the Lowland Dipterocarp forest over time
6. Comparison of the planting along the natural pond edge in March 2016 and October 2017



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7-1



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7-2

- ① The Miyawaki's ecological method to reforestation is based on the theories of potential vegetation and succession theory, which emphasizes using local tree species to realize the best coenotype adaptive to local climate in a rather shorter time.

of lowland dipterocarp and other plants species. Through collaboration among landscape architects, forest ecologists, and contractors, raised berms were designed, engineered, and constructed to provide porosity and prevent compaction. A pre-mixture of highly fertile, organic soil (3-parts topsoil, 1-part raw rice husk, 1-part coconut coir dust, and 1-part chicken manure) was used as a soil medium suitable for the lowland species saplings. The layout of the species was carefully grouped according to successional rate and appropriate water for ground surface level growing conditions. For example, species that thrive in brackish water, such as *Lumnitzera racemosa*, were planted along the canal embankment, species able to survive during intermittent flooding conditions were planted along the riparian edge, while a diverse mix of deciduous forest plants and lowland dipterocarp, such as *Dipterocarpus alatus* and *Hopea odorata*,

covering the area were atop the berms.

About 60,000 trees of more than 279 unique species were planted on approximately 75% of the overall site. Planting locations were also carefully selected based on the type of coverage each successional group would provide. For the initial planting of saplings, a planting density of approximately 4 trees per square meter or a spacing of 50 centimeters was used to encourage natural selection, following Darwinian evolutionary theory "survival of the fittest." The planting design intent also looked to create multiple layers of forest canopy as they appear in nature, which could be created through selection of plant species with various heights in the same community.

In the past 5 years, Miyawaki's reforestation technique was statistically proven to be very successful in many PTT's Protection Strip for Oil and Gas Depot projects around the country, and it

was discovered that the planted saplings normally grow three times higher in the first year and continue to double its height in the second and third year. After three years, the trees were too high to measure their heights, but continued to grow at a diminishing rate, while their canopy coverage appeared significantly denser and a forest atmosphere was formed. Moreover, research found that this reforestation method cost 10 times lesser than other methods, for 10 years of Miyawaki's forest will result in 30 years old of ordinary forest. This growth rate was estimated for Metro-forest project and used to calculate level of skywalk and observation tower, so parts of the skywalk will be hidden under forest canopy in the coming years.

Maintenance of the site will look for the forest to manage itself, as no management is the best management. However, data of plant growth at Metro-forest collected periodically showed that trees grew at the predicted rate. As the forest is evolving to

7. 与2016年相比，一年之后的空中步道已部分被林冠所遮盖。
8. 户外剧场草坪

7. Compared to 2016, parts of the skywalk were hidden in forest canopy in 2017.
8. Outdoor theater lawn

its mature stage, many small animals are induced to create biodiversity and establish new ecosystem for the project. As the on-going project evolves over generations, the succession and richness of biodiversity will be monitored continuously.

Forest in the City: At the Canopy Level

Natural forests are known to have dense canopies, comprising of branches, leaves, flowers, and fruits. The coverage of the canopy is critical to controlling the environment of the forest, revealing function

of urban forest beneficial to the city, and creating forest-like atmosphere. Whether it is light, moisture, or canopy protection, the landscape architects looked at the importance of creating a micro-climate for plants to thrive off for one another and any surrounding elements. At the canopy level, planting at the optimal density and maintaining that density is essential to allow the saplings to flourish while also providing enough canopy interception to reduce runoff and allow for rainwater infiltration. The infiltration of water on-site results in the recharge of the groundwater within





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the constructed berms and conform zero run-off criteria of the project. The eventual spreading canopy of trees in the forest will serve to shade visitors as they trek across the elevated skywalks and create a romantic atmosphere of walking in the air as well.

The earthwork design serves as the backbone of the site's new ecology and accommodates many design criteria including placing berms to direct seepage flow from the built waterfall through the berms' channels. This method followed



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- 9. 俯瞰空中步道及观景台
 - 10. 通向室内展览馆的主入口道路
 - 11-1. 沿秀土走廊陈列的种子展览
 - 11-2. 公园内的青少年学习活动
-
- 9. Overlooking the skywalk and the observation tower
 - 10. Main entrance path to the rammed-earth exhibition building
 - 11-1. Seed exhibition along the rammed-earth corridor
 - 11-2. Youth learning activity

King Bhumipol's irrigation technique done in his Royal Forestry projects in which he imitated the simplest natural drainage way of meandering along different terrain while providing moisture to the reforested areas. Beside the irrigation purpose, the berms were carefully located to improve the site's ventilation, to prevent outside pollutions, to control ground level perspective, and to improve the aesthetic of the forest and its canopy by the plant variety changes along the cross-section of the elevated berms. Control of the canopy and density of planting is crucial to the ambience and design intent of landscape architects to create a forest of seclusion for visitors to escape from the concrete jungles of Bangkok and spend a few hours in the tree wilderness. After the canopy has reached maturation, landscape architects intend to carve out a trail at the ground level to provide an experience revealing the understory. The site has also become a new habitat for flora and fauna to establish their home and for visitors to observe. However, in the early stages of succession, visitors may spend a majority of their time atop the skywalk and observation tower, which were designed to minimize disturbance of the burgeoning forest and allow close-up views of the maturing canopy.

Rejuvenate Places and People

From the waterfall and water channel carved and formed by earth-berm mounding, to the skywalk, observation tower, forest, and rammed-earth exhibition building, the project, which received LEED Platinum NC, is truly a public outreach commitment by the PTT Reforestation Institute to inspire public awareness of urban forestry and the importance of environmental stewardship in Thailand as the created forest has become an extension of the exhibition center from indoors to outdoors. The indoor exhibition comprises of basic knowledge about trees, forests, and their environment, different types of indigenous forest in Thailand, plant's habitat in association with place names, collection of reforestation techniques explored by the PTT Reforestation Institute over the past decades, and the Royal Forestry projects.

The outdoor exhibition covers the whole forest area which is intended to be constantly evolving so that visitors will always be welcomed by "new" experiences during each visit as the forest grew denser and habitats got more diverse over time. The signage along the skywalk explained variation of plant species in conjunction with their canopy form, plant communities, ecosystem and habitat. Able to

experience the different levels of the canopy at the ground-level, along the skywalk, and within the observation tower, visitors will see Bangkok like never before. PTT Reforestation Institute has set up activities and special event programs periodically for various age groups all year long, ranging from seed collecting, producing planting medium, germinate seedling, how to plant a tree, how to create forest, etc. Moreover, participants will receive sapling to take home as a token of appreciation when joining the program, so they can start planting a tree after visiting the project. A natural wilderness that provides an educational and fun experience could perhaps inspire urbanites to plant saplings and grow a forest in their own backyard, as King Bhumipol once stated that "planting a tree in people's heart so they will plant and care for more trees," is fundamental key to successful reforestation.

The Metro-forest is now open to public daily and visitors can request a tour guide from PTT Reforestation Institute's staff at the site office or from online services. The maintenance of the exhibition building follows a normal wear and tear routine procedure, but in the forest zone, since it allows Mother Nature to take control over the forest and lead them to their destination, it is nearly maintenance free. **LAF**

