# 从瓦砾堆到自然保护区
# ——加拿大多伦多汤米－汤普森公园
# From Rubble to Refuge
# —Tommy Thompson Park in Toronto, Canada


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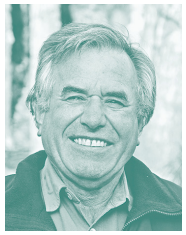

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**摘要**

加拿大多伦多市的汤米－汤普森公园建于一处大型垃圾填埋场上，由安大略湖湖滨向内延伸5km。自20世纪50年代到70年代末，项目利用建筑瓦砾和港口淤泥实施填湖工程，而后因经济形势变化被迫停工。项目搁置后，来自世界各地的众多植物在这里扎根，数百种候鸟在此筑巢觅食，原本的垃圾填埋场自发演变成为了“自然保护区”。20世纪90年代，多伦多市政府通过精心规划设计与施工，将其改造为一座公园——汤米－汤普森公园。通过提高公众可达性、野生动植物和栖息地的多样性，以及生态功能性，汤米－汤普森公园成为了探究自然演变与设计干预之间动态交互的理想案例，我们可以从中探知这两个看似矛盾的过程如何随时间推移而和谐相融。



**关键词**

莱斯利街岬角；人类世生态系统；生态设计；广布植物区系；野生动植物保护区；城市荒野



**ABSTRACT**

Tommy Thompson Park in the city of Toronto, Canada was originally a massive landfilling project that extended 5 kilometers out into Lake Ontario. It was constructed from construction rubble and harbor dredge from the 1950s through the late 1970s, when the project was halted due to changing economic conditions. Left to its own devices, the landfill spontaneously evolved into a “nature preserve” when innumerable plants from around the world established themselves and hundreds of migrating bird species descended on the site for nesting and feeding. In the 1990s, the city of Toronto took control of the site and transformed it into a park—Tommy Thompson Park—after a carefully planned design and construction process. The design interventions enhanced public accessibility, wildlife and habitat diversity, and ecological functionality. Tommy Thompson Park is an ideal case study for examining the dynamic interaction between spontaneity and design and for how, over time, these seemingly contradictory processes can come together harmoniously.



**KEYWORDS**

Leslie Street Spit; Novel Ecosystem; Ecological Design; Cosmopolitan Flora; Wildlife Refuge; Urban Wilderness

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1. 2013年汤米－汤普森公园鸟瞰图

1. Aerial view of Tommy Thompson Park in 2013

① 该书由沃尔特·科姆所著、罗伯特·波利摄影，收录了有关场地历史和生态情况的详尽信息。

① This book written by Walter Kehm with photography by Robert Burley is very comprehensive in its treatment of the site and readers can consult it to form more detailed information about its history and ecology.

## 1 引言

“变化”是城市永恒的主题。城市结构随着城市愿景的不断发展更新而改变，老旧基础设施和废弃建筑纷纷被拆除，场地上堆积着有待处理的挖方土壤。这样的场景也曾在多伦多市汤米—汤普森公园（当地居民称之为“莱斯利街岬角”或“岬角”）上演（图1）。20世纪50年代，圣劳伦斯航道建成后，多伦多港口委员会做出了一项颇具远见的决定——在外港码头新建一处船舶进坞设施来扩建多伦多的内港。计划要求建造一条长达5km的防波堤，直抵安大略湖。新近出版的《偶然的荒野：多伦多汤米—汤普森公园的起源与生态》①一书记录了这一码头扩建计划的历史渊源及其演变为今日汤米—汤普森公园的全过程。

新码头的建设需经历大规模的填湖工程，分三个阶段实施，历时多年。第一阶段起始于20世纪50年代末，首先利用原场地拆除后遗留的大量砖块、混凝土砌块、电线杆、人行道铺装、路缘石、钢筋、彩色厨房地砖和各种骨料等材料铺筑了一条通往湖中央的道路。第二阶段主要对多伦多港外围的泥沙实施疏浚，以开辟一条新航道；疏浚出的泥沙堆积在新建防波堤的西缘，形成了许多湖湾和湖滨空间。到第三阶段，随着泥沙倾倒作业的持续推进，场地的东半侧逐渐围挡出三个湖水充盈的储水空间。在施工高峰期，每天约有三四百辆卡车将混有淤泥和黏土的建筑瓦砾倾倒在岬角东侧。[1]

## 1 Introduction

The only thing constant about cities is change. Old infrastructure is removed, buildings are demolished, and excavated soil has to be disposed of as new urban design visions reorder the structure of the city. Such is the case of Toronto’s Tommy Thompson Park, or as local residents call it, “the Leslie Street Spit” or simply the Spit (Fig. 1). When the St. Lawrence Seaway was completed in the 1950s, the Toronto Harbor Commissioners made a visionary decision to expand Toronto’s inner harbor by creating a new outer harbor port docking facility. The plan entailed the construction of a breakwater extending 5 kilometers into Lake Ontario. The historical origins of this port expansion plan and its evolution into today’s Tommy Thompson Park is the subject of the newly published book, *Accidental Wilderness: The Origins and Ecology of Toronto’s Tommy Thompson Park*①.

The construction of the new port facilities required a massive three-phase lake filling process over many years. In phase one, beginning in the late 1950s, an access road was constructed into the lake using demolition site rubble containing bricks, concrete blocks, utility poles, sidewalks, curb stones, rebar, multi-colored kitchen floor tiles, and a variety of aggregates. During the second phase, sand from the outer Toronto harbor was dredged to create a new ship channel and deposited against the western edge of the new breakwater road, creating a number of embayments and new beaches. The third phase saw continued dumping that filled the eastern half of the site and enclosing three large cells filled with lake water. At the peak of construction, 300 ~ 400 trucks a day deposited construction rubble mixed with silt and clay soil along the east side of the Spit.[1]

年复一年，填湖工程势头未减，最终在湖中形成了一处连通各方的地形，宛如城市中的喀拉喀托火山。场地的最终面积达324hm$^2$，甚至超过了纽约中央公园。依据扩建计划，场地中约一半的区域会被改造为一系列封闭的矩形直壁储水空间，以备将来储存从唐河河口疏浚出的沉积物（可能包含石油副产品、重金属和制药废料等有毒物质）。项目原本计划在填满这些空间后，在其上方铺设防渗层，后覆盖土壤和草皮，将其变身为公园、娱乐或潜在商业用地。20世纪70年代末，受当地水运航线调整的影响，这一宏大的岬角扩建计划因资金中断而被迫搁置。

多年来，重启岬角项目的提案层出不穷，但悉数被否，其中反对声最大的是一个名为“岬角之友”的社会团体。然而，项目的悬而未决倒给了大自然母亲出手的机会：海鸥和燕鸥纷纷在平坦的瓦砾堆上筑巢；丛生的杂草也吸引了成千上万只加拿大雁（*Branta canadensis*）迁徙至此。但鸟类的迅速繁殖已对居民的生活造成了干扰，人们不得不通过在鸟蛋上涂油的方式来加以控制。20世纪90年代，双冠鸬鹚（*Phalacrocorax auritus*）开始在高大的美洲黑杨（*Populus deltoides*）上筑巢并迅速繁殖（图2）。直至今日，这片岬角仍然是这些物种在北美地区最大的繁殖地。

在实施改造前，场地只通过一条光秃秃的道路与外界相连，道路两侧皆是排水沟。20世纪70年代末，沃尔特·科姆（本文第一作者）初次到访岬角，第一印象是“仿佛行驶在法国的乡间小路上”：十米高的美洲黑杨在潮湿的排水沟中自然生长，笔直成列，如同人工栽植的一般齐整，令人惊叹（图3）。这份来自大自然的“种植设计”作品或许在启示我们，景观设计师应该让自然自由发展，并通过不断优化地形坡度和排水策略来提升场地的生态功能性和生物多样性。

每次到访，汤米—汤普森公园总会发人深省，它仿佛在提醒我们：多伦多——乃至所有其他城市——都不过是自然演绎的结果。人们将粘土烧成砖，将石灰石制成水泥，从乡间冰川沉积中开采骨料制作混凝土

Year after year, work continued unabated and eventually produced a highly branched landform that emerged from the lake like an urban Krakatoa. The final build out covered more than 324 hectares—a parcel of land larger than Central Park in New York City. As part of the plan, approximately half of the area was left as enclosed water cells which were engineered as rectangular straight wall structures with the capacity to receive a large quantity of sediments dredged from the Don River containing potentially toxic substances such as petroleum by-products, heavy metals, and pharmaceutical waste at some point in the future. The original idea was to slowly fill the cells to capacity, at which point they would be capped with an impervious layer and then covered with soil and grass so that they could be used for park, recreation or possibly commercial activities. The ambitious port expansion plan for the Spit came to an abrupt halt in the late 1970s when shifts in regional shipping routes destroyed the economic underpinnings of the project.

Over the years, various schemes were proposed for redeveloping the unfinished Spit and one by one they were rejected as a result of the opposition expressed by a variety of individuals and, most significantly, a community group known as the “Friends of the Spit.” It was during this period of indecision that Mother Nature took matters into her own hands as gulls and terns found the level rubble to be a safe place for building nests. Once grasses started growing, the Canada Geese (*Branta canadensis*) arrived and before too long, thousands of them had migrated to the Spit. They formed huge breeding colonies to the extent that they were seen as nuisances that had to be controlled by oiling their eggs. In the 1990s, Double-Crested Cormorants (*Phalacrocorax auritus*) began nesting in the tall Eastern Cottonwoods (*Populus deltoides*) and rapidly multiplied (Fig. 2). Today, the Spit contains the largest breeding colony of this species in North America.

Access to the site at this time was provided by the barren, linear access road with drainage ditches running parallel to it for its entire length. The senior author’s (Walter Kehm) first impression of the Spit in the late 1970s was one of driving along a French countryside lane. Straight lines of Eastern Cottonwood had seeded themselves in the wet ditch bottoms. At 10 meters in height, they created a formidable, straight allee that felt like it had been intentionally planted (Fig. 3). The realization that nature was creating its own planting plan suggested

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2. 在多伦多市中心附近筑巢的双冠鸬鹚
3. 自行车道两旁的美洲黑杨笔直成列

2. Double-Crested Cormorants nesting close to downtown Toronto
3. Bike path lined with Eastern Cottonwood trees

4-1

4-2

5

砌块、人行道铺装和路缘石；再用铁矿石加工钢筋、钢梁，用石英砂制造玻璃。堆积在岬角上的建筑瓦砾和其他各类碎片经过波浪冲击等风化作用后变为了小颗粒，不仅为植物生长提供了基质，也为野生动物提供了栖息地（图4）。原本笔直矗立的建筑化身为瓦砾，成为了一方沃土——汤米—汤普森公园中发生的自然过程仿佛令这座城市看到了重生的机遇（图5）。

## 2 来自公众的支持

20世纪80年代，多伦多及地区保育局受托为这一废弃的岬角制定未来规划[2]，但各类提案都遭到了公众的反对。正如上文所述，“岬角之友”在抵制场地中的一切大规模建筑或商业开发计划中展现了其重要影响力。

在这个漫长的公众参与过程中，生态演替也在场地中稳步进行。春夏时节，新形成的浅滩成为了鸟类和哺乳动物的栖息地，鱼类种群也迅速增长。同时，借助风和鸟类的传播，来自全球各地的温带植物也纷纷扎根于此（图6，7）。[3]不论源自何方，这些植物都已预先适应了这种由湖中瓦砾构成的生长环境。从这层意义上说，这些植物虽不同于欧洲殖民前在湖岸占主导地位的历史植物群，却也称得上是岬角的乡土物种。

为了回答“未来在哪里”这一长久以来困扰岬角发展的问题，科姆受聘为首席景观设计师，与EDA规划及景观咨询公司共同制定方案并召

4-1. 公园东侧堤坝上的美洲山杨（*Populus tremuloides*）及金属废弃物（摄于2019年）
4-2. 公园东侧堤坝上的建筑瓦砾与植物（摄于2019年）
5. 从公园最南端的灯塔角看多伦多的天际线（摄于2019年）

that the role of landscape architects should be to let nature evolve without interference and to enhance ecological functionality and biodiversity through the design of new topographic grading and drainage strategies.

Visiting Tommy Thompson Park is always a humbling experience because it reminds the visitor that Toronto, like every other city, is really just a rearrangement of elemental nature. Clay became bricks, limestone became cement, and aggregate quarried from glacial depositions in the countryside formed into concrete blocks, sidewalks, and curbs. Steel rebar and beams are made from iron ore and glass comes from silica sand. Through wave action and weathering, the construction rubble and other miscellaneous debris that were deposited on the Spit were pulverized into small particles that provide the substrate for plants to grow on and, by extension, habitat for wildlife (Fig. 4). As a result of these natural processes, Tommy Thompson Park has emerged as a reincarnation of the city (Fig. 5), albeit in a horizontal rather than a vertical mode.

## 2 Public Advocacy

In the 1980s, the Toronto and Region Conservation Authority was given the responsibility to develop plans for the future of the abandoned Spit[2]. However, various concepts were proposed and rejected by the public. As noted above, the Friends of the Spit group was particularly effective in facilitating the defeat of any plans that called for large-scale buildings or commercial development.

Through this long public engagement process, ecological succession proceeded at its own steady pace. New species of birds and mammals arrived in spring or summer and in the newly formed shallows, fish populations have expanded dramatically. Simultaneously, plant species from all parts of the temperate world became established, transported there by birds or the incessant wind (Fig. 6, 7).[3] Regardless of where they might have originated, the cosmopolitan array of plants that now grow on the Spit are pre-adapted to the conditions created by dumping rubble in the lake. In this sense then, these plants—as opposed to the historic flora that dominated the lake shore before European settlement—are the Spit's native species.

To address the impasse question “What is the future of the Spit?”, the senior author was retained as the principal landscape architect with the firm of EDA

4-1. Quaking Aspen (*Populus tremuloides*) trees with metal parts along the east side dike in the park, 2019.
4-2. Plants growing from the rubble in the shoreline of the east side dike, 2019.
5. View of the Toronto skyline from the southernmost Lighthouse Point in the park, 2019.

开公众会议开展评估。科姆经常在这里骑行，对场地十分熟悉，他也一直在思考如何才能将生态融入公园设计中。当前的景观设计课程会教授学生如何在景观上叠加形态，这一专业也因此被视为一门“在所有地理空间层次上赋予景观以形态并提升其功能性的艺术和科学”。依据这种说法，景观设计就是要不加掩饰地实施人工干预，并将设计师个人主观感受融入设计过程之中。但景观设计课程中极少充分探讨如何营造可以让动植物自由演化、让以人为核心的元素退居配角的环境。汤米—汤普森公园的设计过程即体现了这种不同以往的理念——首先关注野生动植物的栖息需求，而后才是人的需求。

1985年，项目进行了为期一年的公众意见收集活动，公众的支持与参与是该规划设计的一个关键流程。其中景观设计师主要负责组织和举办公众集会，听取各方对公园未来的愿景，同时推动不同利益群体间达成共识。意见收集过程中召开了多次会议，每次会议可容纳约100人，分为10组，每组分别开展圆桌会议。在景观设计师简要介绍后，人们可利用场地基础平面图、白纸和彩笔，自由画出他们理想中的公园景观，最后各组派一位代表对本组方案进行详细说明。这种方式使与会人员达成共识：应保留场地的自然风貌，就像未曾规划设计过一样——这一愿景为后续总体规划的制定奠定了基础。

## 3 生态设计

进入正式设计阶段后，项目团队首先围绕湖泊气候展开了详细的场地分析，包括风向、潜在种源地、场地水文、土壤、野生动物迁徙模式和植被动力学等；而后了解了可能在场地中出现的植物、鱼类、鸟类和哺乳动物的栖息地需求，将其纳入设计考量。最终，由科姆制定的“保护性设计”总体规划将整个场地划定为城市野生自然保护区，以保护生

Collaborative to prepare plans and hold public meetings for their evaluation. He was very familiar with the area as he often frequented there for bicycle riding and had long been intrigued by the question of how ecology can be incorporated into the park design process. Landscape architects are taught in design studio to superimpose form on the landscape. The profession's definition is seen as "the art and science of giving form and enhancing function to the landscape at all geo-spatial levels." This statement implies overt intervention and allows for the inclusion of the designer's subjective feelings. What is not taught sufficiently is how to create environments where plants and animals are allowed to evolve on their own and the human-centric elements play a supporting rather than a leading role. The design process for Tommy Thompson Park was unusual in that it focused primarily on the understanding of the habitat needs of wildlife, and secondarily on the human needs.

Public advocacy and participation was a critical piece of the planning and design process during the one-year time period, in 1985, that was allocated for citizen involvement. It was the responsibility of the landscape architect to organize and host public gatherings to obtain input from the public on the park's future and to reach consensus among conflicting stakeholders. The public process involved several meetings in a room accommodating 10 round tables with seating for 10 people at each table. A site base plan, blank paper, and colored pens were provided for each table. After the landscape architect's introduction, the people were asked to freely draw their ideal views of the park. The intuitive drawings from each table were collected and a spokesperson from each table gave a short presentation on their plan. The diagrams and sketches resulted in the participants reaching a consensus that kept the site natural and seemingly unplanned—a vision that later became instrumental in the development of the master plan.

## 3 Ecological Design

The formal design process began with a careful site analysis of the lake climate, including wind directions, the location of potential seed sources, site hydrology, soils, wildlife migration patterns, and vegetation dynamics. In addition, research was conducted to understand potential plant, fish, bird, and mammal habitat requirements that could be incorporated into the design. The master plan prepared

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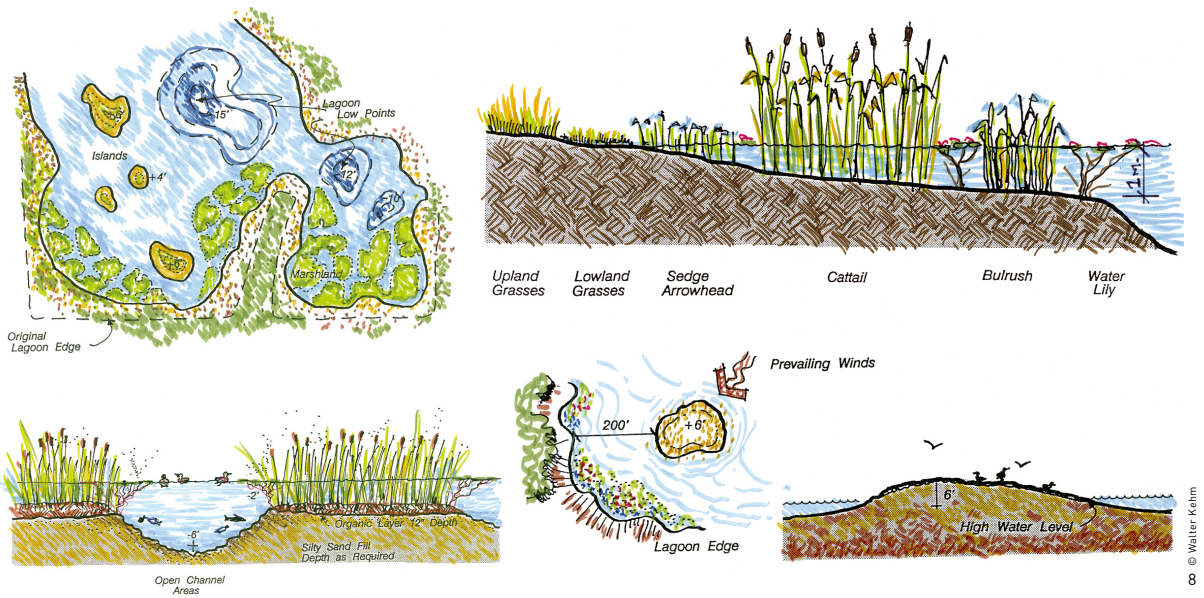



6. 公园低沼泽区中的野花（摄于2014年）
7. 二号储水空间及湿地（摄于2020年）
8. 湿地设计草图示例

6. Wildflowers in the Flats in the park, 2014.
7. The Wetlands, Cell 2, 2020.
8. Samples of wetland sketches

物多样性、促进城市居民的身心健康。[4]依据总体规划，场地需禁止机动车通行，并设置多条步道和自行车专用道，方便游客到访。

项目采取了多项人工干预措施来推动生态进程、营建多样化的栖息地。其中最重要的一项举措是打破原有的直壁储水空间，将其改造为具有不同水深且边缘起伏的湿地，并建立水生植被（图8）。[5]在后来的湿地规划方案中，这些空间用于疏浚物填埋，并在水下1~1.5m处封顶。20世纪90年代，一号储水空间中的首片湿地建设启动，建成后就成为了鸟类、鱼类和两栖动物的重要栖息地。其他储水空间的改造目前也正在实施或规划中。

汤米—汤普森公园的景观形态融合了坡地和排水设计考虑，为生态修复提供了基础。在地形设计过程中，风是首要考虑因素之一（设计需要考虑当地的盛行风向），而后需逐步确定地形高程、朝向和日照，划定陡坡和缓坡、低湿洼地和离水区域、冷热坡面、低压潜在种子沉积区等，并绘制相应的剖面图和坡度断面图（图9）。

地形设计细致地考虑了场地的排水需求。一般而言，场地中的水会在滞蓄区就地收集，而溢流则可依地势在湿地间流灌。时至今日，这项设计的效果已经显现：湿生植物——尤其是红枝山茱萸（*Cornus sericea*）——生长旺盛，而美洲山杨（*Populus tremuloides*）、美洲黑杨和刺槐（*Robinia pseudoacacia*）等先锋树种则取代了原本在湿地离水边缘扎根的繁茂灌丛。这些植被吸引来了更多的野生动物，包括郊狼、河

by the senior author was entitled “Conservation by Design,” which recommended that the entire site would be designated as an urban wild refuge area and serve as a sanctuary to protect natural biodiversity while simultaneously enhancing human mental well-being and physical health.[4] The site should be car free and contain numerous hiking trails and designated bicycle pathways to enhance accessibility.

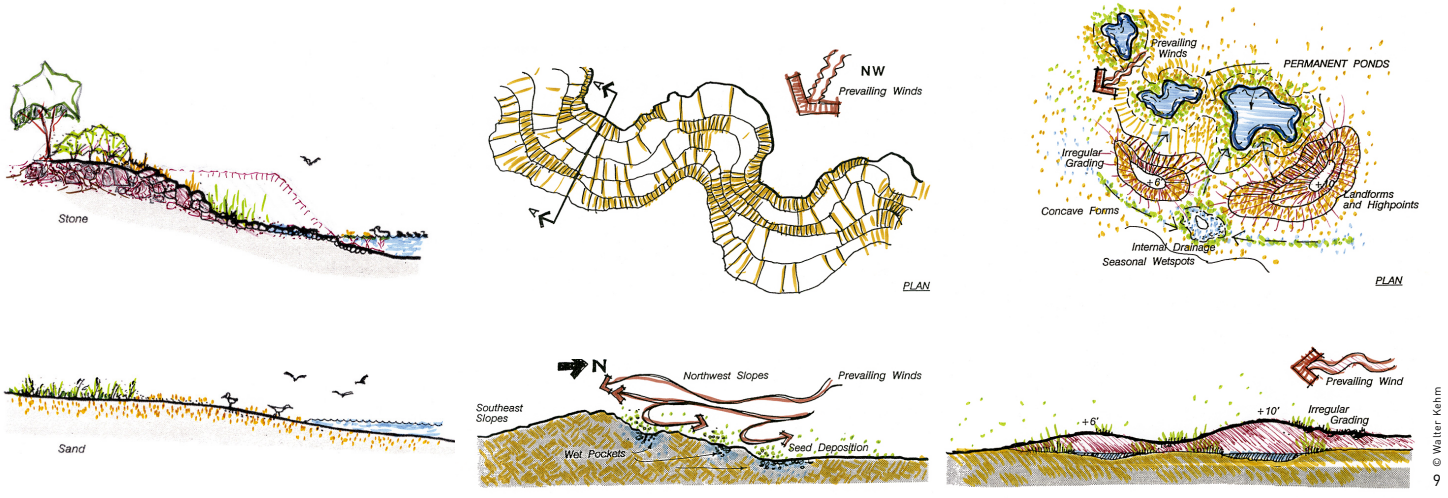
To foster ecological processes and create diverse habitats, several design interventions were implemented. The most important of them was the elimination of the engineered straight walled retention cells by converting them into wetlands with varying water depths and undulating topographic edges that allowed for the establishment of aquatic vegetation (Fig. 8).[5] This plan was abandoned and replaced with a wetland proposal in which filling with dredge material would be capped at approximately 1 ~ 1.5 meters below the surface of the water. The construction of the first wetland in Cell 1 started in the 1990s and upon completion it has become an important habitat for birds, fish, and amphibians. The remaining cells are in varying stages of construction or planning.

The ecological regeneration plan for Tommy Thompson Park was based on the design of grading and drainage into landscape topographic forms. Wind became one of the most important considerations, as the prevailing breezes would provide guidance for landform design. Landform height, aspect and solar exposure, steep and shallow slopes, wet depressions and dry areas, hot and cool slopes, and low pressure potential seed deposition zones were selected and developed with cross-section sketches and grading plans (Fig. 9).

The design of the landforms was guided by the creation of sensitive drainage plans. Water was to be captured on site in detention and retention areas with overflows that allow for decanting from one wet area to another. On site today, the significance of this design intervention is evident: plants needing wet conditions, notably the shrubby Red-Osier Dogwood (*Cornus sericea*), are getting what they need while at the drier edge a dense thicket of shrubs took root and eventually gave way to pioneer trees including Quaking Aspen (*Populus tremuloides*), Eastern

9. “保护性设计”总体规划中的典型剖面示例
10. 公园中的灯塔角（摄于2020年）
11. 公园中随处可见简易的砖块雕塑
12. 2020年2月更新后的汤米－汤普森公园总平面图

9. Typical Cross Section of the Conservation by Design
10. Lighthouse Point in the park, 2020.
11. Sculptures that can be found throughout the park
12. Tommy Thompson Park site plan, updated in February 2020.




9

狸、水獭、鼬、蛇、乌龟、老鼠和田鼠。大量鸟类的光临也使这里成为了观鸟胜地。

随着步道设施的不断完善，这座公园如今已化身为一处都市秘境。在这里，人们可以暂时忘却城市的喧嚣，拥抱荒野，看一抹斜阳掠过城市中的湿地湖湾，看成群的飞鸟空中翱翔（图10）。河滩上成堆的红砖黄砾、混凝土砌块、条形地砖和钢筋成为了艺术创作的源泉，砖块雕塑在公园中随处可见（图11）。人们还利用这些材料搭建了温馨的休息区，可以眺望广阔无垠的水域。汤米—汤普森公园的经验或许可以为规划设计工作带来启示：人们青睐那些能够参与其中、与之互动的环境，同时也享受动植物不受人类干扰、自由生长的自然环境。简言之，人们更希望融入自然，而非与自然对立。如今新冠肺炎（COVID-19）疫情肆虐，诸如汤米—汤普森公园一类的场所可以为人们提供大自然的庇护，场地中小型草地或沼泽地居多，虽然不适宜聚集性活动，但湖滨的碎石堆为人们提供了休憩和缓解精神压力的私密空间（图12）。疫情之下，公园的游客量大涨，但即使游客密度增加，地形开阔的汤米—汤普森公园仍未给人拥挤之感——这种安全的社交距离正是出于自然的设计。

## 4 人类世生态系统

汤米—汤普森公园的成功有目共睹，但它同时也给了我们一个重要启示：大自然做功并非一朝一夕之事，与生态系统相关的问题也不是设计师一张图纸就可以解决的；相反，它们会随着外界的变化缓慢而自由地发展。工程师和景观设计师们为汤米—汤普森公园的生态演变创建了良好条件，让大自然这位主人可以打开大门迎接各位“宾客”的到来。如今，已有约350种鸟类来此栖息，这也为公园赢得了全国“重点鸟类保护区”的美誉。

当然，汤米—汤普森公园的自然生态群落并非适合所有生物。自20世纪90年代起，14 000多对双冠鸬鹚来此安家，产生的鸟粪不仅臭气熏天，还导致美洲黑杨这一优势种的大量死亡，并由能够在高氮土壤环

Cottonwood, and Black Locust (*Robinia pseudoacacia*). As these vegetation processes have unfolded, wildlife has become more abundant in the park, including coyotes, beaver, otter, mink, snakes, turtles, mice, and voles. The abundance of avian life makes it a favorite destination for birdwatchers.

Because of enhanced pedestrian accessibility, the park has become an urban sanctuary where the residents of Toronto’s densely populated inner city can connect directly with an urban wildness. They can watch brilliant sunsets illuminating the city over wetland embayments or see huge flocks of birds soaring overhead (Fig. 10). The piles of bricks (both red and yellow), concrete blocks, kitchen tiles, and rebar that cover the beaches have become a source for people’s artistic expression as evidenced by the sculptures found throughout the park (Fig. 11). People also use these materials to create intimate sitting areas looking out over an infinite expanse of water. The lesson for park planning and design is that people enjoy visiting places where they can manipulate the environment to create a personal connection to the site and where nature is allowed to follow its own trajectory with a minimum of human intervention. In short, these are places where people feel they are part of nature, not a threat to it. Today, with the COVID-19 pandemic raging, a place like Tommy Thompson Park is important because it allows people to find a safe refuge in nature. The natural conditions of the site provide a series of small meadows or glades like spaces that discourage large gatherings and the water edge with piles of rubble become private sitting areas where people come to rest and relieve mental stress (Fig. 12). Site visitations have never been higher, but even with this increased density Tommy Thompson Park still feels uncrowded because of its wide open topography. Nature has spontaneously provided a design for self-distancing.

## 4 A Novel Ecosystem

For all its success, however, Tommy Thompson Park does come with one important caveat—it takes time for nature to do its work. Ecosystems are not

境中生存的繁茂底层草本植被逐步取代——虽然枯木的枝丫仍可供鸟类筑巢。随着时间的推移，不论是陆地上还是水中残留的鸟粪，都将促进一个外观上截然不同的生态系统的形成。

这处延伸至安大略湖中由垃圾填埋而成的场地本不存在任何原生物种——可以说，汤米—汤普森公园不同于任何“自然”生物集群，而是生态学家所谓的“人类世生态系统”的一个完美实例。在这里，人们得以探究在城市化、全球化和气候变化的相互影响下，可适应环境急速变化的韧性生态系统的构建过程[6]。地球生态系统的未来无从预知，但汤米—汤普森公园的成功足以让我们更加乐观地展望未来——不论人类对地球造成何种困扰，我们都可以借助大自然的力量解决难题。**LAF**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designed in an air-conditioned downtown office, rather they develop slowly and unpredictably in response to real world conditions. Engineers and landscape architects set the table for ecological change in Tommy Thompson Park, but nature controlled the ever-expanding guest list that now consists of some 350 species of birds—a huge number that has earned the park national recognition as an “Important Bird Area.”

This is not to say that the spontaneous ecological community in Tommy Thompson Park is to everyone’s liking. The 14,000-plus pairs of Double-Crested Cormorants that began arriving in the 1990s produce copious amounts of smelly excrement that has killed many of the large Eastern Cottonwoods that once dominated the site. While the skeletons of the dead trees still serve as nesting sites for the birds, a thick under-story of herbaceous species that can tolerate the high levels of soil nitrogen has replaced them. Over time, the legacy of guano, both on the land and in the water, is facilitating the development of an ecosystem that will look very different from the one that is there today.

Given that nothing is native to a landfill jutting out into Lake Ontario, Tommy Thompson Park is a perfect example of what ecologists refer to as a “novel” ecosystem that has no analog with any “natural” assemblage of organisms. As such, the park presents a unique opportunity to study the processes whereby the forces of urbanization, globalization, and climate change interact to produce a resilient ecosystem that can track rapidly changing environmental conditions[6]. While the ecological future of planet Earth is uncertain, the existence of Tommy Thompson Park offers a reason for optimism because it shows that nature can be a willing partner in helping clean up the mess people have made of the planet. **LAF**

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