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A Call for an Ecological Approach to Landscape Design in Hong Kong

從生態角度探討香港的園境設計

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Introduction

Landscape design, management and maintenance in Hong Kong is dominated by what I would call an "ornamental-horticultural" driven approach that places primacy on visual appearance at the expense of all other considerations apart from cost (both capital and recurring). Furthermore the visual aesthetic being pursued by the landscape designer and (more critically) client in Hong Kong is most often a highly manicured "artificial" one in which plants are clipped and/or organised into obviously man-made individual topiary shapes and geometric layout patterns. This is part of a world-wide tradition in the historic development of the garden as a "gesture against the wild" in which humans find pleasure and comfort in bringing a sense of visual order and structure to the seemingly random and uncontrolled natural world.

Yet I believe strongly that we need to move towards a more balanced approach to the design of man-made landscape in Hong Kong that looks beyond purely visual appearance and places much greater emphasis on sustainability and ecological sensitivity.

簡介

一直以來，香港的園境從設計、管理到保養都以「觀賞性園藝」作大前提，一切都以外觀為先，除了成本及經常性開支外，其他方面絕非主要考慮。更甚的是，香港的園境師，以至角色更為關鍵的客戶，他們所要求的外觀和美感，往往只追求高度「人工化」的修飾，令植物都被修剪及整理得有如人工雕塑及幾何圖案。歸根究底，這是由於世界各地的傳統，將花園的發展歷史視為「馴服野性」的結果，以致人們認為視覺上整齊有致的花園比不受控制，隨意率性的自然世界更為賞心悅目。

然而，我深信我們有必要在設計本港的人工園境時採取一套更平衡的方式，不應只着重外觀，同時亦應更重視可持續性及生態敏感度。

Why Adopt an Ecological Approach to Landscape Design and Management?

At a fundamental level there are two main reasons to adopt an ecological and sustainable approach to landscape design and management:

- to preserve, use and manage landscape resources for the benefit of present and future generations; and
- to preserve and promote biodiversity which is essential for the health of the planet.

We live in an era of rapid urbanisation. 70% of the world's population is expected to live in cities by 2050. The resultant pressure on natural landscapes and biodiversity across the world is well documented and a source of much concern. However, there are also negative impacts on humans as a result of this urbanisation process that has distanced our daily activities from the rhythms and processes of nature.

為何設計及管理園境時要著重生態影響

基本而言，採納一套着重生態和可持續性的園境設計及管理方式有兩大原因：

- 為這一代及下一代的福祉，去保護、善用和管理園境資源；以及
- 保護及促進生物多樣性，這對於地球的健康至關重要。

現今世代都市化急促擴張，至 2050 年全球七成人口預計會居於都市。現時已有不少數據反映，都市化對全球自然景觀及生物多樣性所構成的壓力，情況令人憂慮。另一方面，都市化進程亦令人類的日常活動與大自然的節奏及過程越見疏離，對人類造成負面影響。



Image Source: Hong Kong Green Building Council

The 'Biophilia' Hypothesis and Biophilic Design

"Biophilia" means "love of life or living systems". The biophilia hypothesis suggests that humans possess an innate tendency to seek connections with nature. Edward O. Wilson expressed the hypothesis in his book, *Biophilia*¹ (1984) in which he defines biophilia as "the urge to affiliate with other forms of life".

There is an increasingly large body of scientific evidence citing the many and varied physical and mental health benefits to humans of maintaining close connection with nature, yet the urbanisation process has meant that city populations are becoming increasingly disconnected from the natural world.

Cities are intrinsically the most sustainable form of development for large populations, enabling the most efficient use of resources and potentially the smallest carbon footprint per capita whilst also raising living standards. Yet dense city living can cause a "disconnect" from nature and natural rhythms and processes, especially for the young. In his best-selling book *Last Child in the Woods*² (2008) Richard Louv coined the term "nature deficit disorder" to describe a common malady of city dwelling kids who spend too much time indoors, in front of the TV, or on the computer, and have too little access to nature, too little freedom to explore nature and over-protective parents.

We need to restore the city dweller's connection with nature and "Biophilic Design" is city planning and design that enables and facilitates the urban population to (re)connect with nature.

「親生命假說」及「生命親和」設計

「親生命性」即「喜愛生命及生命系統」，而「親生命假說」就是指人類都有種親近大自然的本性。愛德華·威爾遜在其著作《親生命性》¹ (1984) 中就提到「親生命性」是「與其他生命連繫的慾望」。

越來越多的科學證據顯示，人類貼近大自然對身心健康有着各種各樣的好處。不過，都市化進程卻令城市居民與大自然越見疏離。

本質上，城市是龐大人口所衍生出最可持續的發展模式，既可令資源得以有效善用，使人均碳足印減至最少，同時令我們的生活水平提高。不過，在人煙稠密的都市中生活亦會令我們脫離自然和當中的自然節奏及過程，這對於年輕人影響猶甚。理查·洛夫在其暢銷著作《失去山林的孩子》² (2008) 中創出的「大自然缺失症」一詞，就是描述居住在城市的孩童的常見通病，他們終日足不出戶、只顧看電視玩電腦、太少接觸和自由探索大自然，而父母亦傾向過於保護子女。

我們應該重建城市人與大自然間的聯繫，而在城市規劃和設計中套用「生命親和」設計正正可令都市的居民再次親近大自然。

In Hong Kong, we are blessed with close juxtaposition of dense urban areas and relatively "wild" natural landscapes (see **Figure 1**) that contain remarkably high biodiversity for such a relatively small geographical area. This is principally due to the mountainous nature of Hong Kong which has largely restricted development to low-lying areas with shallow slopes, so leaving the large intervening areas of steep terrain largely undeveloped, however it is also due to the wisdom and foresight of men and women of the previous generation who put in place a high level of statutory and non-statutory landscape protection (see **Figure 2**), something that current decision makers would do well to remember.

香港得天獨厚，人煙稠密的市區與野外山水風光僅僅咫尺之遙（見圖1），彈丸之地卻蘊藏多姿多彩的生態，多得香港的山勢令發展集中於低地及淺坡，留下大片陡峭地勢未被用作發展。當然，這亦歸功於前人的睿智和遠見，訂定法定及非法定的景觀保護地區（見圖2），現今負責決策的官員確要緊記。

1 Satellite view of Hong Kong showing the large proportion of undeveloped green areas and the high degree of interstition between developed and undeveloped areas.
香港的衛星影像顯示大部分土地為仍未發展的綠化地帶，而已發展區與未發展區間有大片分隔。

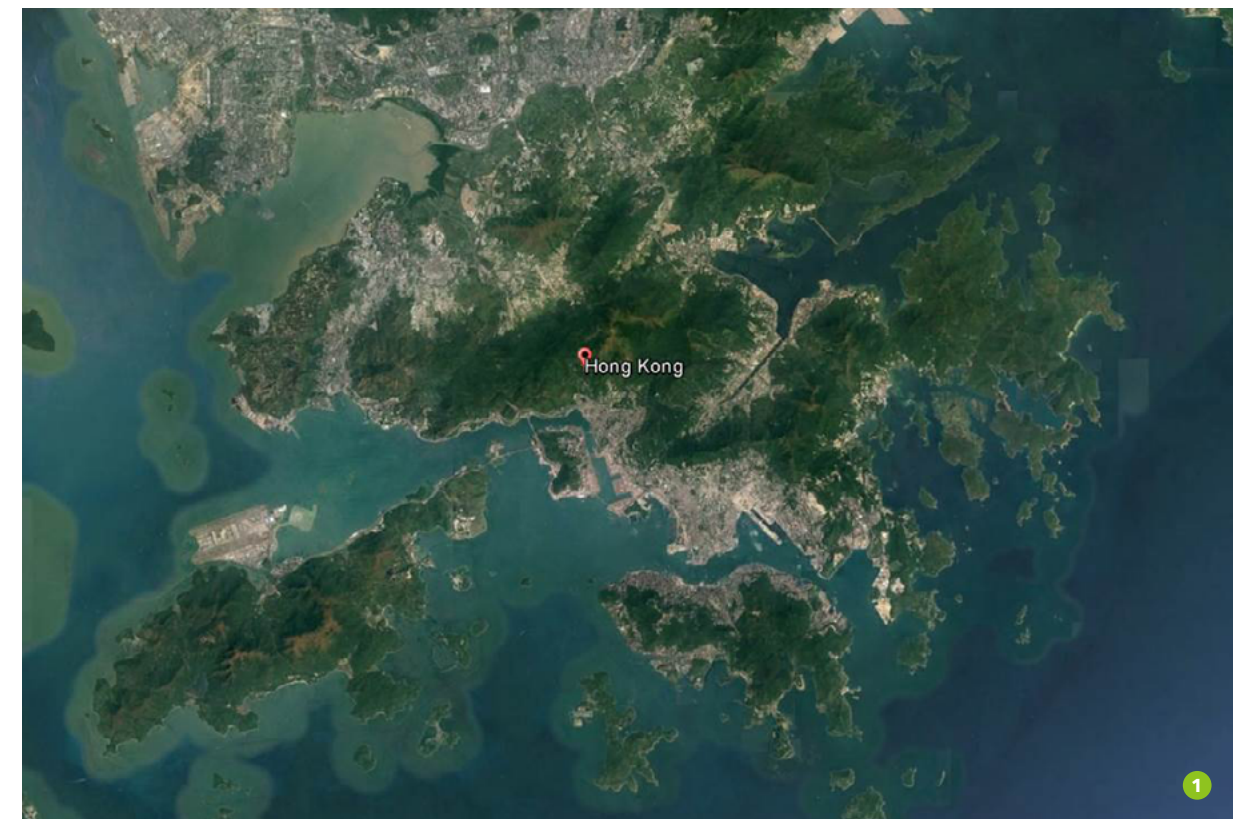


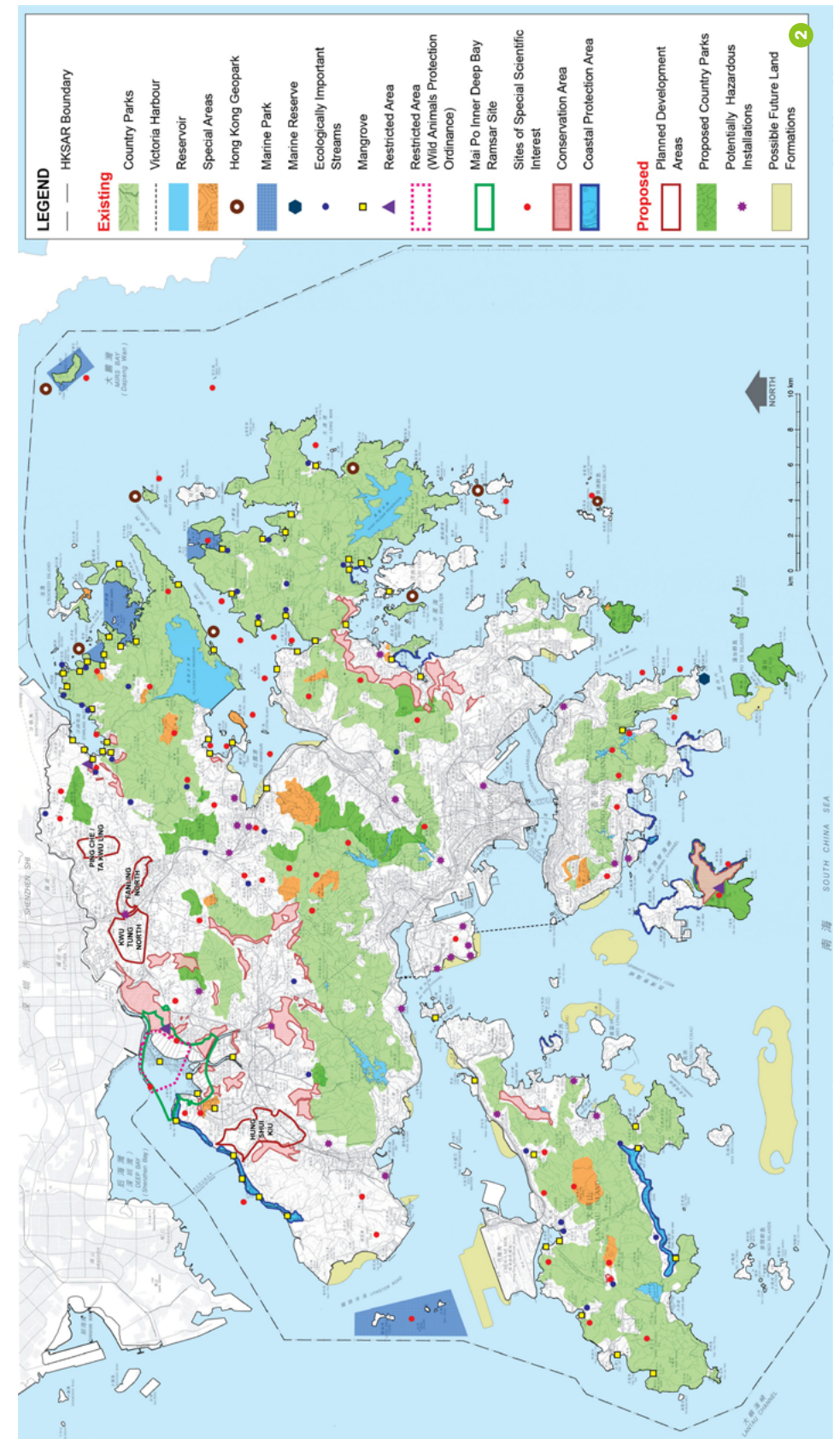
Image Source: Google Earth

At a macro level, the sustainability of Hong Kong's natural landscape and ecology as a whole is largely dependent on continuing to limit development within as small an area as practical in order to leave large areas of natural landscape and high biodiversity and ecological value relatively untouched, yet accessible to the public for passive recreation and reconnection with nature to promote general health and wellbeing. The ability of our Country Parks to offer a quick and convenient getaway from the pressures of dense urban living is an asset that will become increasingly important and provide a significant advantage to Hong Kong in the face of the fast pace of urbanisation in the Greater Bay Area and Guangdong Province.

Yet protecting our existing resources is not enough – we also have to design the developed areas in a more ecologically sensitive manner in order to create a sustainable and liveable city in which we can all enjoy a high quality of life yet also reduce our collective carbon footprint and maintain our connection with the rhythms of the natural world. Adopting an ecological approach to landscape design can facilitate this process.

宏觀而言，要香港整體自然景觀和生態得以永續，實在有賴於在顧及現實的情況下，盡量限制發展面積，以保留大片高生物多樣性及高生態價值的自然景觀不受滋擾，同時，方便市民在自然環境進行舒展身心的活動，與大自然重新建立聯繫，以促進大眾的身心健康。我們的郊野公園正可為大眾提供一個快捷方便的方法逃離都市煩囂，在本港日後面對大灣區及廣東一帶急促都市化的步伐時，這個自然資產會變得更加珍貴，亦可為本港帶來極大優勢。

然而，單單保護現有資源並不足夠。我們應以更關顧生態環境的方式去設計已發展的地區，以建立一個可持續及宜居之城，令大家既可享受優質生活，亦可為整個城市減少碳足印，並與大自然的節奏保持連繫，而考慮生態元素的園境設計正合所需。



2 Statutory and non-statutory landscape protection in Hong Kong
香港境內法定及非法定的景觀保護地區。

How to Adopt an Ecological Approach to Landscape Planning, Design and Management?

如何在園境規劃、設計及管理上顧及生態

The ecological planning, design and management approach may be considered as a 5-step process:
以生態角度進行園境規劃、設計及管理大致可分為以下五大步：



To implement steps 3 (Mitigate) and 4 (Create) there are several planning and design strategies that may be adopted by the designer to a greater or lesser degree according to the scale and context of the project to promote an ecological approach to landscape design, as listed below.

要落實第3步（緩減）及第4步（締造），園境師可運用以下幾種規劃和設計的策略，並可按項目的規模及環境選擇應用的程度，從而以顧及生態的方式設計園境。

Adopt the "Right Plant, Right Place" strategy. Simply put, this approach matches plants to their intended landscape design function and their intended environment and microclimate to help ensure the plants will serve the intended purpose, be healthy, grow well and need minimum care in the long term.

採用「合適植物、合適地點」的策略，即將植物用於配合園境設計時所構思的功能、環境及微氣候，以確保植物用其所、健康生長，長遠而言亦不需多加護理。

Promote native plants that enhance biodiversity & complement adjacent natural landscapes.

推動栽種本地原生植物，以提高生物多樣性，並與毗鄰自然環境互補。

Incorporate water bodies and associated planting. Water is a natural attractor to wildlife.

野生生物天生親水，因此可加入水景和相關的植物。

Promote viable plant communities & resilient ecosystems.

栽種「粗生」的植物群落，建立適應力強的生態系統。

Leave some areas devoid of human activity to allow natural processes to take over.

保留部分位置範圍禁止人類活動，以容許自然過程作主導。

Avoid invasive plants. Much damage may be caused to local ecosystems if exotic species escape into the countryside and displace native species.

避免栽種入侵性植物，因外來物種如進入本地郊野會驅逐原生物種，嚴重損害本地生態系統。

Choose plants that promote wildlife biodiversity and design for wildlife.

選擇可促進野生生物多樣性的植物，設計時亦考慮到野生生物的生長環境。

Promote connectivity between existing and proposed plant communities. As predicted by the Island Biogeography Theory, apart from plant species, the major factors affecting the colonisation of urban landscapes by wild biodiversity are:

- the size of the landscape planting i.e. the bigger the better; and
- the degree of isolation from natural vegetation i.e. the closer and greater connection the better.

促進現存植物與計劃栽種植物群落的連繫。根據島嶼生物地理學理論，除植物物種外，影響都市園林中野生生物多樣性的主要原因包括：

- 園境的面積，即越大越好；以及
- 與自然植被的分隔程度，以較貼近和聯繫較好為佳。

The multi award winning Hong Kong Wetland Park (Figures 3 to 6), designed jointly by Architectural Services Department and Urbis Limited and opened in 2006, incorporates all of these design measures and is a highly successful example of ecological landscape design that delivers recreational and education benefits and has proven hugely popular with the public. How can this success be replicated on smaller projects elsewhere in Hong Kong?

於 2006 年開幕的香港濕地公園 (圖 3 至 6) 由建築署及雅邦規劃設計有限公司 (雅邦) 聯手設計，屢獲殊榮。公園運用了上述設計措施，是個十分成功的生態園境示範之作，寓消閒於教育，廣受公眾歡迎，但這個項目的成功如何可複製至本港其他較小型的項目？

3 The Hong Kong Wetland Park incorporates all the ecological landscape design principles described in this chapter
香港濕地公園涵蓋本章提及的各項生態園境設計原則

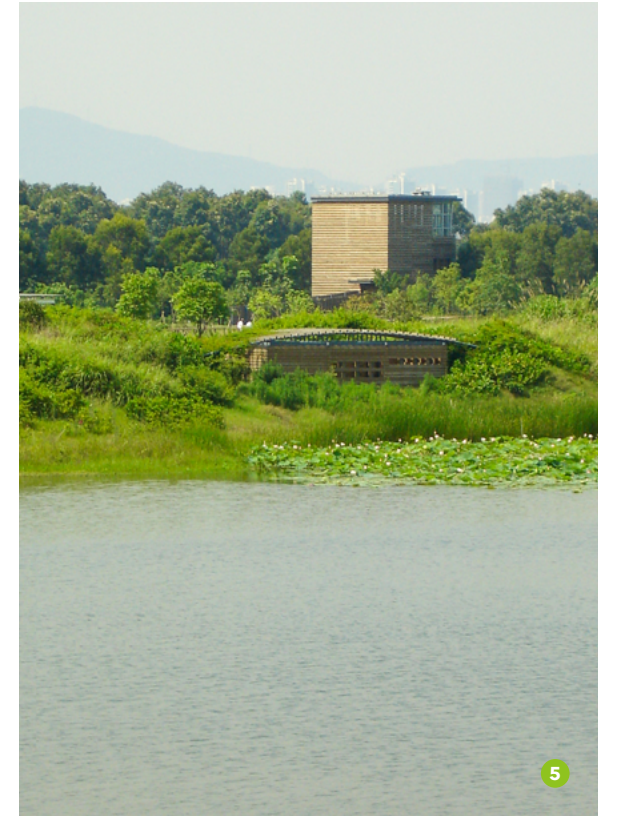
4 The upland stream, Hong Kong Wetland Park
香港濕地公園上游

5 Bird hides, Hong Kong Wetland Park
香港濕地公園觀鳥屋

6 The lowland stream, Hong Kong Wetland Park
香港濕地公園低地溪流



Image Source: Agriculture, Fisheries and Conservation Department



Factors Hindering the Implementation of the Ecological Design Approach in Hong Kong

Perhaps the biggest problem facing landscape architects seeking to implement an ecological approach to their designs in the urban area is the common public perception of what urban landscape should look like. As mentioned above, landscape design in Hong Kong is dominated by an "ornamental-horticultural" driven approach that places primacy on visual appearance at the expense of other considerations. This attitude may be seen partly as a result of the aforementioned "disconnect" with nature in modern Hong Kong society. This perception naturally has great influence on developers in the private sector who are developing projects to sell to the public. The only way to overcome this in the long term is to change this public perception through education and by bringing the public's attention to the importance of working with, rather than against, ecological processes. The Government's recently introduced *Hong Kong Biodiversity Strategy and Action Plan*³ (HKBSAP) identifies four Action Areas, namely Conservation, Mainstreaming, Knowledge and Community, and lists public awareness and education as key areas requiring attention.

本港難以推行生態設計模式的原因

或許園境師要在市區的設計中推行顧及生態的方法，所面對的最大難題是在於公眾對都市園境根深蒂固的看法。一如前述，香港的園境設計以「觀賞性園藝」為主，一切都以外觀為先，而絕少考慮其他因素。此一看法或許源自前文所提及關於現代香港社會與大自然的疏離所致，當然，這種想法自然亦會深深影響銷售物業予公眾的發展商。長遠而言，唯一的解決辦法只有以教育改變公眾看法，令公眾意識到與生態過程共存的重要性，而非對其摒棄。政府最近推出的《生物多樣性策略及行動計劃》³ 載列了四大行動範疇，分別為「保育」、「主流化」、「知識」及「社會參與」，亦將公眾教育及宣傳列為重點。

Another major hurdle facing landscape architects is the lack of commercially available native plant species. Commercial nurseries stock plants they know the market demands and traditionally this has been dominated by exotic species. Increasing the quantity and variety of native plants that are commercially available will be a slow process if left solely to market forces, since it remains easy for suppliers to substitute exotic species for native species originally specified by the designer. Therefore I believe that Government should speed up this process by initiating a programme to encourage development of native nursery stock. Planting native species is a goal of HKBSAP and creating Government nurseries for native species can greatly help achieve this for Government projects.

園境師面對的另一難題是市面上缺乏本地原生物種的供應。私營苗圃會按市場需求存貨，而長久以來外來物種都是市場寵兒。如單靠市場力量去增加原生物種的數量及種類，需時頗長，這是由於供應商可輕易將園境師所要求的原生物種以外來物種代替。因此，我認為政府必要推出計劃鼓勵發展原生物種庫存，從而令增加原生物種的數量及種類的時間縮短。事實上，種植原生物種是《生物多樣性策略及行動計劃》的目標之一，政府建立原生物種苗圃將可大力推動於公營項目達成目標。



Image Source: Hong Kong Green Building Council

Another challenge facing the designer is the relatively small scale of the average landscape project, and the intense competition for space in urban Hong Kong. How does a landscape designer promote biodiversity in a small to medium site? Planting one specimen each of hundreds of different species is usually not the best answer and in seeking a solution we need to consider how ecologists measure biodiversity. Ecologists distinguish between alpha, beta and gamma diversity where alpha diversity is the species richness within a community (site), beta diversity is the measure of how many species the community has that are not present in adjacent communities and gamma diversity is the total number of species in the region. So the designer interested in biodiversity conservation should assess how the alpha diversity of the site can contribute to the gamma diversity of the region. The other principal approach that designers can adopt to promote biodiversity is to design for wildlife.

另一個園境師所面對的挑戰，是一般園境項目相對而言規模較小，但香港市區寸金尺土，園境師如何在中小規模的地盤上促進生物多樣性？在數百種植物中各選其一通常都不是最好的做法，因此我們最好先了解生物學家如何量度生物多樣性。生物學家以 α 、 β 及 γ 分辨生物多樣性： α 多樣性是指群落（場地）中物種的數量， β 多樣性量度一群落與鄰近群落的物種數量差異，而 γ 多樣性是指一大範圍內的物種數量。因此，有志於保育生物多樣性的園境師應評估地盤的 α 多樣性對該範圍的 γ 多樣性所佔比重；而另一個促進生物多樣性的方法則是採用考慮野生生物的園境設計。

How Do We Measure Biodiversity?

我們如何計算生物多樣性？

α

Alpha diversity refers to the average number of species diversity in a habitat or specific area. Alpha diversity is a local measure.

α 多樣性指一特定地點內的平均物種數量

β

Beta diversity refers to the ratio between local or alpha diversity and regional diversity. This is the diversity of species between two habitats or regions.

β 多樣性比較兩個不同特定地點的物種多樣性

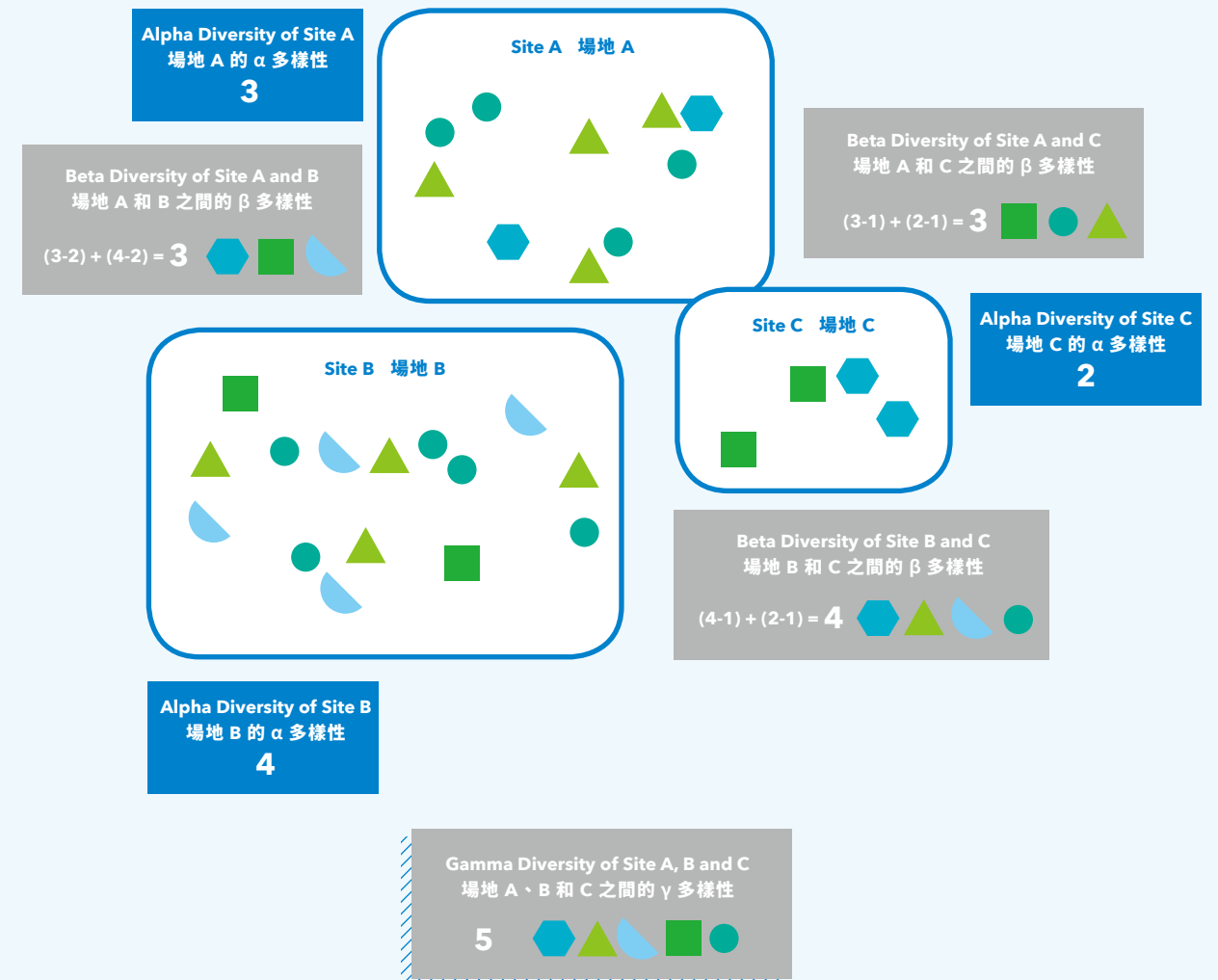
(number of species in Habitat 1- number of species Habitat 2&1 have in common) +

(number of species in Habitat 2- number of species Habitat 1&2 have in common)

γ

Gamma diversity is the total diversity of a landscape.

γ 多樣性表示所有上述地點總合的物種多樣性



Designing for Wildlife

One sad bi-product of the SARs epidemic in 2003 has been an increased fear of birds and wildlife amongst some members of the public. Landscape designers are frequently requested by private clients to "choose plants that don't attract insects and birds", which may be the result of the client's own prejudices but is more likely their perception of the prejudices of their prospective customers. The sole exceptions to this are butterflies that remain popular (in most cases). Of course these same clients often ask for plants with profuse flowers throughout the year, at which point I usually ask them if they know why plants have flowers – i.e. to attract insects to encourage pollination!

Therefore, since most urban sites are constrained in planting opportunities, the designer has to think beyond plant species diversity, consider how their plant choices affect total plant, insect and animal wildlife diversity and choose plants that promote wildlife. To do so they may consult references such as *GEO1/2011 - Technical Guidelines on Landscape Treatment for Slopes*⁴ which has plant selection matrices providing information on ecological value, and *A Comprehensive Street Tree Management Plan for Hong Kong*⁵ prepared by Urbis for Development Bureau. In compiling the latter document we engaged Dr Billy Hau of the University of Hong Kong to undertake a review of local literature and compile lists of plants that provide food and habitat for fauna native to Hong Kong, including birds, butterflies, bats and squirrels. The result is a series of eight tables that should prove useful to landscape designers seeking to encourage wildlife (Figure 7).

考慮野生生物的設計

2003年沙士疫情其中一個令人惋惜的負面影響，是令到部分市民對雀鳥及野生動物越趨避之則吉。園境師經常需要面對客戶要求「選擇不會吸引蟲鳥的植物」——這當然可能是客戶自己的偏見，但更有可能是他們認為潛在客戶所持有的偏見。而唯一例外的是蝴蝶，在大部分情況下仍受歡迎。當然這些客戶也會經常要求植物常年繁花盛放，我唯有問他們是否了解植物為何開花——為的就是吸引昆蟲傳播花粉！

因此，由於大多數市區地方種植機會都受很多限制，園境師要考慮的不止於物種多樣性，而是所選種的植物會如何影響整體野生植物、昆蟲及動物的整體多樣性，並選用可促進野生生態的植物。他們可參照土力工程處刊物第1/2011號—《斜坡的園境設計技術指南》⁴內載的植物選擇表所提供的植物生態價值資料，另可參考由雅邦為發展局編寫的《香港街道樹木管理計劃》⁵。在編纂後者時，我們邀得香港大學侯智恒博士翻閱本地文獻，從而得出為雀鳥、蝴蝶、蝙蝠、松鼠等本土動物提供食物及生境的植物列表，而此一系列共八個列表對致力促進野生生物成長的園境師而言相當有用（圖7）。

7 *A Comprehensive Street Tree Management Plan for Hong Kong* prepared by Urbis Limited for Development Bureau, includes an Annex with lists of plants that provide food and habitat for fauna native to Hong Kong, including birds, butterflies, bats and squirrels.

雅邦為發展局編寫的《香港街道樹木管理計劃》中附有為雀鳥、蝴蝶、蝙蝠、松鼠等本土動物提供食物及生境的植物列表。

One interesting piece of information arising from the research is the significant extent to which exotic species can provide food and shelter for native fauna, which is great news for the designer because it means that many of the commercially available exotic plant species traditionally selected for their visual qualities can also serve a useful ecological function. Nevertheless, in the absence of other supporting information, it is usually best to stick with native plant species when seeking to provide food and shelter for wildlife. For example, at Kai Tak River in Kowloon, we have incorporated a number of predominantly native shrub and climber species to attract bees, butterflies, dragonflies and birds, as well as incorporating native mangrove species into the channel bed to create suitable conditions for young fish-fry and amphibians to develop. In addition, several other ecological enhancement measures are incorporated at Kai Tak River.

是次研究其中一項有趣之處，是在很大程度上，外來物種亦為本土動物供應不少食物及棲身之所。這對園境師而言是一大好消息，代表市場上提供的外來物種，除了因外觀而獲選種外，亦有其生態功能。話雖如此，在未有足夠證據支持下，以本土物種作野生種物的食物來源及棲息地仍屬最佳選擇。以九龍的啟德河項目為例，我們以本土灌木及攀藤植物為主作設計，以吸引蜜蜂、蝴蝶、蜻蜓及雀鳥，並於河床種植本土紅樹林品種，為魚苗及兩棲類幼體營造合適的成長條件。除此以外，啟德河亦加入了其他可提升生態環境的措施。

Resources offered to1				Birds				Squirrel	Bats	Butterflies
Plants species	Chinese name	Origin	Growth from	So 1999	Lock 2000	Corlett 2005	Corlett 2006	Ho 1994	Shek 2006; Corlett 2005; 2006	Bascombe et al. 1999; Lo 2004
Acacia auriculiformis	耳果相思	Exotic	Tree		F	F				
Actinidia latifolia	關葉彌猴桃	Native	Climbing shrub					F, S		
Albizia corniculata	天香藤	Native	Climbing shrub							FP
Albizia lebbek	大葉合歡	Exotic	Tree							FP
Aleurites moluccana	石栗	Exotic	Tree					F, S, L, B		
Amaranthus spinosus	刺莧	Exotic	Herb							FP
Amaranthus tricolor	莧菜	Exotic	Herb							FP
Amaranthus viridis	綠莧	Native	Herb							FP
Antidesma bunius	五月茶	Native	Tree		F					
Aporosa dioica	銀柴	Native	Tree		F					
Archontophoenix alexandrae	假檳榔	Exotic	Tree palm		F?			F, S, Fl		
Arenga pinnata	砂糖椰子	Exotic	Tree palm		F					
Artabotrys hexapetalus	鳳爪花	Exotic	Shrub							FP
Asclepias curassavica	連生桂花	Exotic	Herb							FP, N
Asparagus densiflorus	非洲天門冬	Exotic	Herb			F				
Atalantia buxifolia	酒餅筋	Native	Shrub							FP
Barleria cristata	假杜鵑	Exotic	Subshrub							FP
Bauhinia x blakeana	洋紫荊	Native	Tree		N	N				FP
Bauhinia variegata	宮粉羊蹄甲	Exotic	Tree		N	N		Fl, L		
Berchemia floribunda	多花勾兒茶	Native	Climber					F, S		
Bischofia javanica	秋楓	Native	Tree		F					
Boehmeria densiflora	密花芋麻	Native	Shrub							FP
Boehmeria nivea	芋麻	Exotic	Shrub							FP
Bombax ceiba	木棉	Exotic	Tree		N	N		F, S, Fl	N	
Brassica oleracea var. botrytis	椰菜花	Exotic	Herb							FP
Brassica oleracea var. capitata	椰菜	Exotic	Herb							FP
Brassica parachinensis	菜心	Exotic	Herb							FP
Breynia fruticosa	黑面神	Native	Shrub							FP
Bridelia tomentosa	土蜜樹	Native	Tree		F			F, S, L		FP
Broussonetia kaempferi var. australis	藤構	Native	Climber		F					
Broussonetia papyrifera	構樹	Native	Tree			F				
Calliandra haematocephala	朱櫻花	Exotic	Shrub			N				
Callistemon viminalis	串錢柳	Exotic	Tree		N	N				
Camellia granthamiana	大苞山茶	Native	Tree					Fl		
Canarium tramdenum	烏欖	Exotic	Tree		F?					
Capparis acutifolia	獨行千里	Native	Climber							FP
Capparis cantoniensis	廣州糙果藤	Native	Shrub							FP
Caryota maxima	魚尾葵	Exotic	Tree palm		F?			L		

Urban Plant Species Beneficial to Local Fauna in Hong Kong

Plant names are updated according to Hong Kong Plant Database of the Hong Kong Herbarium <http://www.hkherbarium.net/Herbarium/frame.html>.

Notes: 1 F-fruits; F?-fruits that appears for birds without sighting records; S-seeds; Fl-flowers; L-leaves; B-barks; P-Piths; I-insects; N-nectar; NS-nest sites; RS-roost sites; FP- larval foodplants of butterflies

Landscape Design Components at Kai Tak River

The Kai Tak River Rehabilitation, with the landscape designed by Urbis Limited, incorporates a number of predominantly native shrub and climber species to attract bees, butterflies, dragonflies and birds, as well as native mangrove species in the channel bed to create suitable conditions for young fish-fry and amphibians to develop.

1 Planting along Channel Bed

In the wider sections of the channel, emergent plant species are used to introduce greening and create a naturalistic river effect without impeding floodwaters. They are planted into submerged "grasscrete" panels to stabilise their roots, and they will provide potential habitats for young fish and amphibians as well as attracting birds and pollinating insects such as bees and butterflies. Emergent species include native aquatics such as *Crinum asiaticum* and native mangrove species *Acanthus ilicifolius*, *Aegiceras corniculatum* and *Excoecaria agallocha*.

Flowering from January to September, *Excoecaria agallocha* attracts pollinating insects such as bees that are vital to a healthy ecosystem.

Plants of the *Acanthus* genus are food sources for larvae of *Junonia almana* (Peacock Pansy), *Junonia iphita* (Chocolate Pansy) and *Junonia orithya* (Blue Pansy).

2 Planting along Channel Walls

The use of artificial rock to simulate bedrock in the lower portions of the channel walls provides excellent opportunity for incorporation of shrub and climber planting to enhance the greening effect and promote a naturalistic design by draping down or scrambling up over the rocks. Primarily native plant species are selected to attract wildlife such as birds, butterflies and dragonflies.

Clerodendrum inerme is salt-, heat- and wind-tolerant and has beautiful fragrant white flowers that attract adult butterflies including *Pachliopta aristolochiae* (Common Rose) and leaves that provide food for larvae of *Junonia orithya* (Blue Pansy).

啟德河的園境設計元素

雅邦負責啟德河修復工程的園境設計，以原生灌木及攀藤植物為主，以吸引蜜蜂、蝴蝶、蜻蜓及雀鳥，並於河床種植原生紅樹林品種，為魚苗及兩棲類幼體營造合適的成長條件。

1 沿河床種植

在河道較寬闊處種植挺水植物品種，既可加入綠化元素，亦可在不阻礙防洪下營造天然河道外觀。植物種於浸沒在水中的草磚以穩定根部，可為魚苗及兩棲類幼體提供潛在生境，亦會吸引雀鳥及蜜蜂、蝴蝶等傳粉昆蟲。挺水植物包括本土的水生植物如文殊蘭、本土的紅樹林品種如老鼠筋、蠟燭果／桐花樹及海漆。

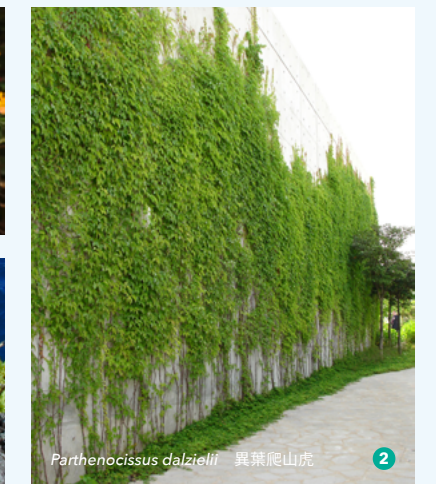
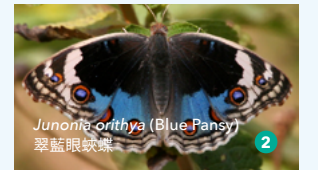
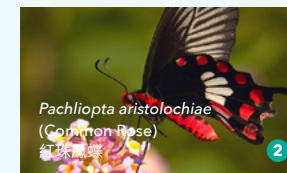
海漆花期由 1 月至 9 月，可吸引蜜蜂等昆蟲傳播花粉，對健康的生態系統發展十分重要。

老鼠筋屬的植物是美眼蛺蝶、黯眼蛺蝶及翠藍眼蛺蝶幼蟲的食物來源。

2 沿河道牆身種植

以人工大石模擬河道牆身下半部分的基岩最為適合種植灌木及攀藤植物，以增加綠化效果，而植物在大石間下垂、覆蓋亦可塑造自然景觀，當中主要選種原生植物品種以吸引野生生物，如蜜蜂、蝴蝶及蜻蜓。

苦郎樹，又稱苦楮、假茉莉，是種耐鹽、耐熱及耐風的品種，其白花香氣四溢，可吸引成年蝶如紅珠鳳蝶，而葉片則可作為翠藍眼蛺蝶的食物。



Ecological Improvement Measures at Kai Tak River

A number of design measures are incorporated to encourage wildlife and promote biodiversity within the river channel.

Aside from the planting design, the Kai Tak River Rehabilitation also incorporates a number of other ecological enhancement measures.



啟德河的生態改善措施

項目為令河道更適合野生生物成長並促進生物多樣性，加入了多項設計。

在種植設計以外，啟德河修復工程亦加入多項其他的生態改善措施。

Preservation of Existing Trees 保留原有大樹

A primary concern from the outset has been the retention of all existing Ficus trees along the channel walls adjacent to Lee Kau Yan Memorial School. These trees provide a beautiful greening effect as well as providing cooling shade for the river and an important habitat for wildlife.

項目開展之初的一大關注點，是將李求恩紀念中學一邊沿河壁種植的榕樹全數保留。這排大樹既帶來悅目的綠化效果，亦為河道遮擋陽光，為野生生物營造一個重要的生境。



Boulders in the Channel Stream 水流中的巨礫

Small clusters of boulders are placed along the edges of the channel at irregular intervals so as to create eddies and swirls in the water flow that can provide some shelter for fish to rest.

多個小堆的巨礫在河道邊緣按不規則間距擺放，在水流中形成漩渦，為魚類提供藏身休息的地方。



Fish Refugia 魚類庇護位

Occasional cavities are created in the submerged portions of the channel walls to create areas of calm water for fish to rest away from faster flowing waters in the channel.

河道牆上浸沒在水下的部分多個位置均被挖空，形成靜水區供魚類在水流湍急時作休息之用。



Planting along Channel Bed 沿河床種植

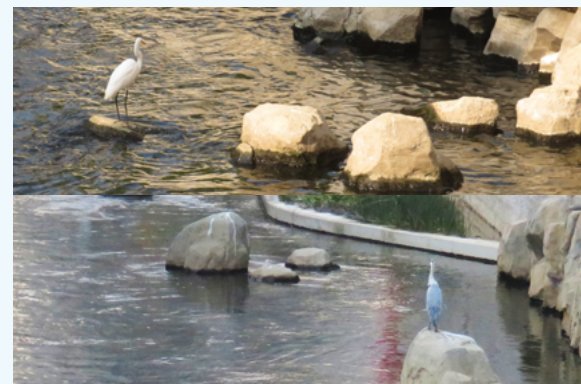
The planting of emergent plant species, including mangrove species, in submerged grasscrete panels in the wider sections of the channel provides areas of calmer water for fish to gather. They also provide potential habitats for amphibian species, insects and birds.

在河道較寬闊處浸沒於水中的草磚上種植包括本土紅樹林品種在內的挺水植物品種，可提供水流較平靜的地方供魚群聚集，亦為兩棲類物種、昆蟲及雀鳥提供潛在生境。



Native Plant Species 本土植物品種

Primarily native species are used for planting in the channel bed and in the channel wall rockwork. These native species help provide habitat and sustenance for many species of native wildlife (fish, amphibians, insects and birds) and in so doing help to promote biodiversity and reintroduce nature within the river corridor. 種於河床及河壁仿石上的植物大部分均為原生植物品種，為眾多本土野生生物（魚類、兩棲類、昆蟲、雀鳥）提供生境及食物，從而促進生物多樣性，為河道帶來無窮生機。



Bird Perches 雀鳥棲息地

The rockwork along the channel creates ideal perches for birds who feed on the fish in the river.

雀鳥以河中魚類為食糧，河道中的仿石就成為了絕佳的棲息地。

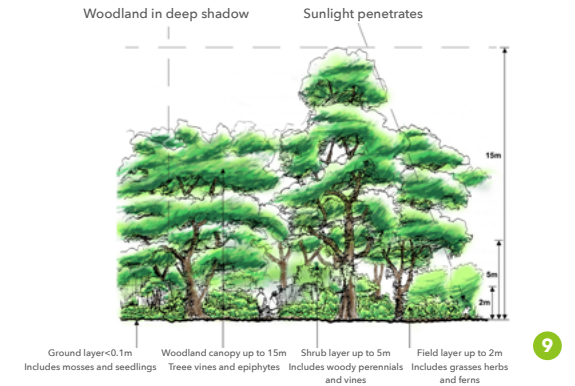
Aside from species selection, designers can promote wildlife by creating vertical layering within the plant community. In a natural plant community the tree canopy layer (5-15m), shrub layer (2-5m), field layer (0.5-2m) and ground layer (0-0.5m) each have important roles to play in providing food and habitat for wildlife. At Shek O Quarry Rehabilitation (Figures 8 & 9), we planted a mix of exotic pioneer trees and native trees and shrubs with the intention of creating such a layered woodland structure in the long term. Similarly, at The ZCB Park in Kowloon Bay (Figure 10) we created an Urban Native Woodland that incorporates over 40 different species of native trees and shrubs to simulate native woodland and provide food and shelter to attract native wildlife into the city. This latter project typified the problems facing local designers in sourcing native plants, as we were unable to obtain large stock sizes of many native trees and had to resort to planting mostly young whips and seedlings, so it has taken several years for the woodland to establish.

Hong Kong Wetland Park, Shek O Quarry and the Urban Native Woodland in the ZCB Park exemplify designs that seek a natural appearance using native plants, yet even in more consciously "ornamental" planting design mixing natives and exotics, it is still possible to create a more layered vegetation structure than usually found in Hong Kong public landscapes. Many public open spaces and roadside landscapes are unfortunately characterised by over-pruned and ecologically sterile planting with shrub beds pruned at uniform heights with little or no variation of plant form, height or structure creating landscapes that can be both visually boring and ecologically sterile (Figure 12). Landscape designers and maintenance agents should instead seek to create more layered planting effects for visual and ecological benefits, such as we have attempted at Pacific Place (Figure 11) and 19 Wang Chiu Road, Kowloon Bay (Figure 13).

除物種選擇外，園境師亦可藉著植物群落中做出垂直分層的效果，以促進野生生物成長。在天然的植物群落中，樹冠層（5至15米）、灌木層（2至5米）、草本層（0.5至2米）及地面層（0至0.5米）在為野生生物提供食物及生境中各司其職，在石澳石礦場的修復工程中（圖8及9），我們混合栽種了外來的先鋒樹，以及本地原生樹木及灌木，作長遠建立分層樹林之用。

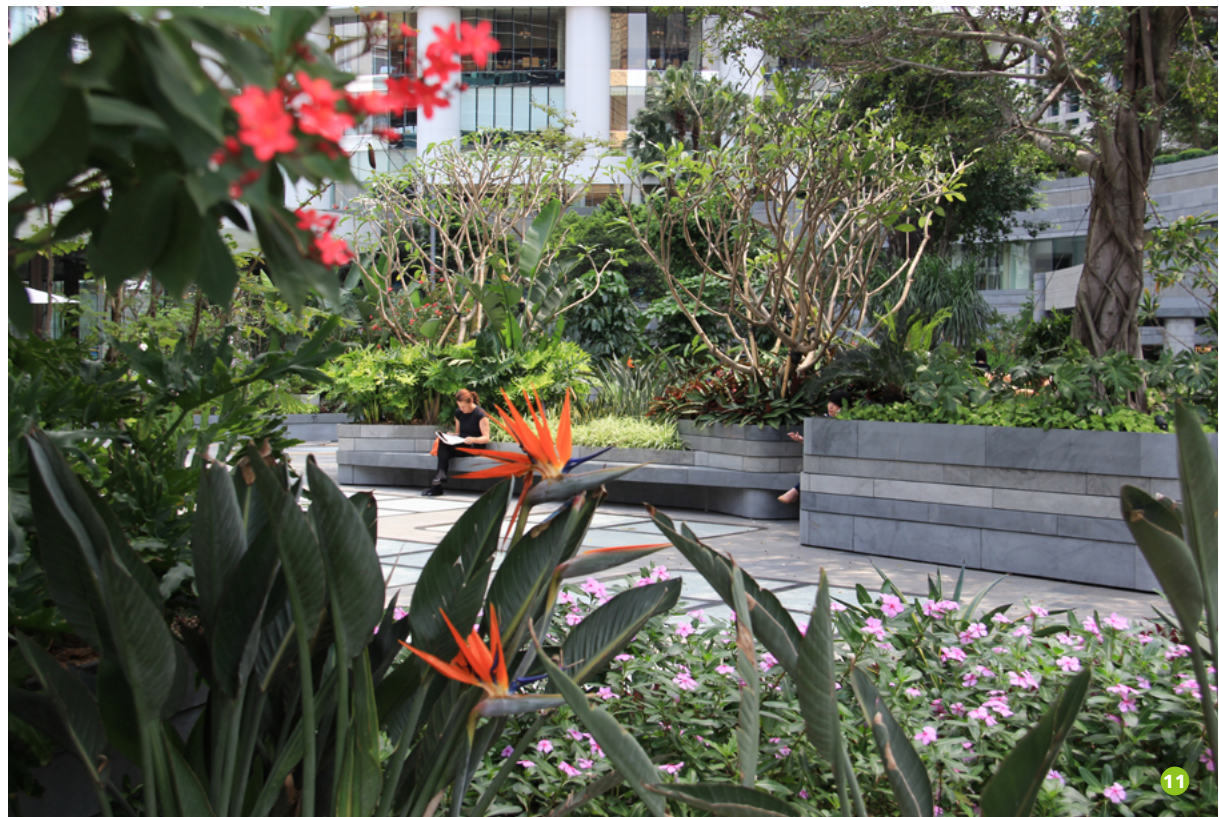
同樣地，我們在九龍灣的零碳天地（圖10）創造一片都市原生林，種有逾40種不同的本地原生樹木及灌木樹種，模仿原生林以供城市中的本土野生動植物覓食及棲身，而此項目更突顯了本地園境師難以尋找本土植物的問題。當時不少本土樹種都欠缺大量庫存，導致我們要靠種植新苗，需時幾年才令原生林漸見雛型。

香港濕地公園、石澳石礦場及零碳天地都市原生林正正展示了以原生植物塑造自然風貌，甚或合種本地原生及外來樹種作「裝飾性」園境設計，仍可創造出比一般本港公共空間的園境設計更有層次的植被結構。不少公共空間及路邊園境不是遭過份修剪，便是一些生態價值不高的灌木樹圃，被修剪至單一或毫無變化的形狀、高度及結構，導致視覺上毫無美感，而生態價值上更乏善可陳（圖12）。園境師及保養人員應力求令植物錯落有致，方可美觀與生態價值並存，例子有太古廣場（圖11）及九龍灣宏照道19號項目（圖13）。



8 9 The planting at Shek O Quarry Rehabilitation incorporates a mix of exotic trees and native trees and shrubs. The exotics are incorporated so as to shelter the natives and assist their growth and development. The exotics should be thinned and eventually removed as the natives develop. 石澳石礦場的修復工程混合栽種了外來樹種、原生樹種及灌木，其中外來樹種的作用為保護本土樹種，以協助其生長。外來樹種應加以疏枝，並在本土樹種長成後移除。

10 The "Urban Native Woodland" at The ZCB Park, Kowloon Bay, incorporates over 40 different species of native trees and shrubs to simulate native woodland and provide food and shelter to attract native wildlife into the city. 零碳天地公園範圍的都市原生林種有逾40種不同的本土樹木及灌木樹種，模仿原生林以供城市中的本土野生動植物覓食及棲身。



11 The Pacific Place podium planting, designed by Urbis Limited, incorporates a large variety of plant species arranged in a naturalistic manner. 太古廣場平台的園境由雅邦設計，融入了大量不同種類的植物，以自然方式展示人前。



12 Many Hong Kong public landscapes are characterised by over-pruned and sterile planting with no natural form or structure. 不少公共空間都充斥遭過份修剪，或生態價值不高且缺乏自然形態的園境。



13 The public open space at 19 Wang Chiu Road, Kowloon Bay, designed by Randle Siddeley Associates and Urbis Limited, incorporates a large variety of native and exotic plant species arranged in a naturalistic manner. 九龍灣宏照道 19 號項目的公共空間由 Randle Siddeley Associates 及雅邦攜手設計，融入了大量不同種類的本土及外來植物，以自然方式展示人前。

BEAM Plus Neighbourhood

The BEAM Plus Neighbourhood (ND) sustainability assessment tool was launched in December 2016 by the Hong Kong Green Building Council (HKGBC) as a means of embodying sustainable design within initial project masterplanning and encouraging project thinking that extends beyond site boundaries into the local neighbourhood community.

BEAM Plus ND assists the landscape designer seeking to promote ecological design because it encourages project proponents to conserve and/or enhance the ecological value of a site in terms of the intactness of habitat and biodiversity through consideration of five planning and design aspects under the credit SA 5 - Ecological Value:

1 credit is awarded when applicant demonstrates the ecological value of the site is enhanced through a preliminary landscape strategy adopted in the site planning.

如申請人可證明在場地規劃時已藉初步園境設計策略而令現場的生態價值提升，可獲 1 分。

1 bonus credit is awarded where site planning enables physical interconnectivity within the site to connect any existing preserved area of medium to high ecological value adjacent to the site with:

- Any existing preserved area of medium to high ecological value within the site;
- Any new green space planned within the site;
- Any new blue asset planned within the site; and
- The total eligible interconnected area is not less than 5% of the total site area.

如選址範圍外／毗鄰有生態價值屬中至高的地方，申請者可透過建立聯繫去提高整體生態價值，而可獲得 1 分額外得分。建立聯繫的方式包括：

- 與任何場地內生態價值屬高至中的現存受保護範圍建立聯繫；
- 與任何場地內新規劃的綠化空間建立聯繫；
- 與任何場地內新規劃的水資源建立聯繫；
- 所建立場內連繫的範圍不少於選址場地總面積的 5%。

綠建環評社區

香港綠色建築議會於 2016 年 12 月推出綠建環評社區評估工具，旨在令項目在總體規劃時考慮可持續設計元素，鼓勵項目不應囿於項目範圍，應同時考慮對周邊社區的影響。

綠建環評社區可協助園境師採用生態設計，評分標準勵項目倡議人藉保護及／或提升選址地點的生態價值。園境師可參考評分指引 SA5 - 生態價值的五個規劃及設計範疇，以提高生境及生物多樣性的完整性：

1 bonus credit is awarded where either all identified habitat types on site are of low or negligible indicative ecological value, or all identified habitat types on site of medium to high indicative ecological value are preserved intact and are either unaffected or enhanced by the planned development.

如所有選址場地的生境，經確認後其生態價值屬低至極低，可獲得 1 分額外得分；或者經確認後其生態價值中或高，只要獲保存現狀、不受計劃的發展項目所影響，或因計劃的發展項目而有所提升，均可獲得 1 分額外得分。

1 credit is awarded where the ecology & biodiversity of the site would be enhanced through an ecological enhancement strategy based on accepted ecological principles & defined goals.

如按生態原則及明確制定的目標所訂的生態提升策略，而令選址場地的生態及生物多樣性提升，可獲 1 分得分。

1 bonus credit is awarded where existing trees are retained in situ such that the combined girth of the retained trees, with individual girth of at least 150mm, is at least 20% of the total girth of all existing trees on site. This is because the ecological value of large preserved trees usually greatly exceeds the value of young compensatory tree planting.

如現有樹木可於原地保存，而所有獲保存樹木的總周長（以每棵樹周長最少 150 毫米計）不少於場地內所有樹木總周長的 20%，可獲 1 分額外得分。由於為保存大型樹木的生態價值通常遠高於補種幼樹，所以可獲加分。

The Way Forward

There is scope for many different styles of landscape design in Hong Kong to satisfy different contexts and aesthetic preferences. Yet, whatever the adopted design style, I believe that landscape designers should seek to look beyond the purely visual to promote designs that also deliver meaningful ecological benefits. The two principal reasons are firstly to support our ailing natural systems and encourage biodiversity and wildlife, and, secondly, by promoting these within the urban area, to help our society reconnect with the rhythms and process of the natural world and thereby improve public health and well-being.

Landscape architects have the knowledge and skills to be leaders in creating a healthy and vibrant Hong Kong. By following the 5-step process outlined earlier - avoid, minimise, mitigate, create and manage - landscape architects can incorporate sound ecological principles into the urban design process. BEAM Plus ND assists the landscape architect seeking to promote ecological design because it encourages project proponents to conserve and enhance the ecological value of a site from the initial project planning stages.

All landscape architects and ecologists can and should contribute to this process but I believe Government must take the lead as it deals with the largest green infrastructure projects that have by far the greatest potential to promote biodiversity at a meaningful scale. Government also has the power and authority to drive the ecological design ethos at a strategic level.

Yet each of us has our own meaningful contribution to make, no matter how small the project, and together we can make a difference and ensure that Hong Kong becomes a beacon of biodiversity and sustainable design that sets an example for the rest of the world.

展望

本港的園境設計風格各式各樣，切合不同環境及美感要求。不過，無論設計風格如何，我相信園境師都不應只局限於外觀，而應着力推動可有益於生態的設計，主要原因有二。首先是要支持我們相當疲弱的自然系統，促進生物多樣性及野生生物的成長；其次，在市區推廣此類設計，可令我們的社會重建與大自然的節奏及過程的連繫，從而促進市民大眾的身心健康。

園境師具備知識及技術去帶領大家建立一個健康和充滿活力的香港。只要按前文所述的五大步：避免、減少、緩減、締造及管理，園境師可將健全的生態原則融入都市設計過程之中。綠建環評社區鼓勵項目倡議人在項目初期的規劃階段中，保護及提升選址場地的生態價值，從而協助希望推動生態設計的園境師達成目標。

所有的園境師及生物學家固然有能力，亦應該在這個過程中多作貢獻。但我相信政府也要以身作則，因其轄下有最大規模的綠色基建項目，這些項目有着相當的規模，正具備極大的潛質去推動生物多樣性。同時，政府亦有權力在策略性的層面上推動生態設計。

其實，無論項目的規模大小，我們都可以各盡本份，在眾志成城下定可帶來改變，令香港在生物多樣性及可持續設計上發光發亮，為全球建立楷模。

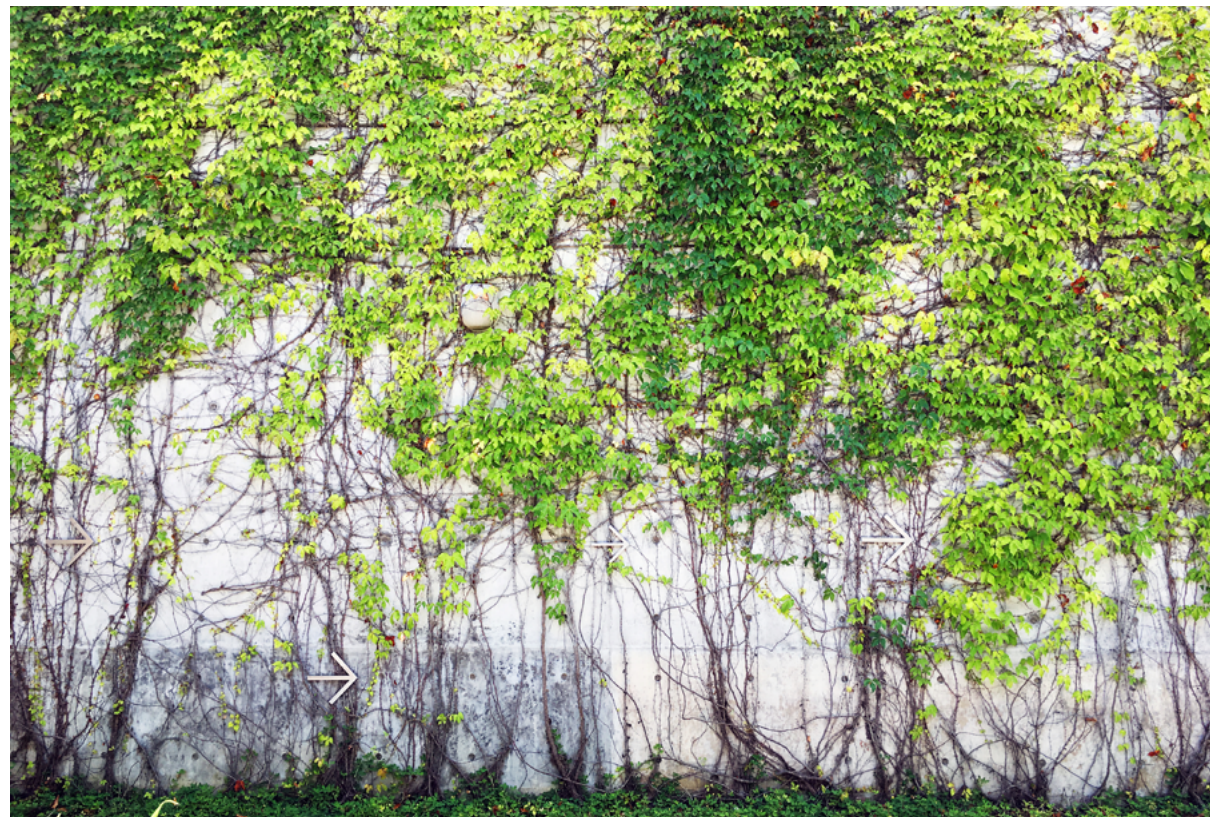


Image Source: Hong Kong Green Building Council

Footnote 註釋

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