香港教育大學
The Education University of Hong Kong

科學與環境學系
Department of Science and Environmental Studies

Ecogarden

簡介 Introduction

生態園位於我校（大埔校園）的東北位置，毗鄰賽馬會學生宿舍及網球場。生態園的設計主要有四個基本意念，包括節能、資源重用和回收，以及維持生物多樣性。園內設施都是為了達到以上四個目標而設立。

The Ecogarden is located at the north-eastern part of our campus, which is next to the Jockey Club Students Quarters and Tennis Court. The Ecogarden is designed with four essential components, including energy conservation, resource reuse and recycling, and biodiversity conservation. Therefore, the facilities in the Ecogarden are set up to meet these targets.

生態園歷史 History of the Ecogarden

生態園原本是一個擁有大型水池的公園，它早期興建的目的只是為了滿足美學及功能上的需要，而生物多樣性並非主要的關注項目。科學與環境學系的學術人員在設計概念上，將這片土地與環境可持續的意念融合。最後，改裝後的生態園於2016年正式面世。

The Ecogarden was a park with a large pond that was aimed at satisfying aesthetic functional needs at the early times when biodiversity was not the prime concern. Academic staff at the Department of Science and Environmental Studies then worked together in the conceptual designs to integrate environmentally sustainable concept into the use of this piece of land. Finally, the Ecogarden began its operation in 2016 after construction and renovations.

AQUAPONICS SYSTEM 魚菜共生系統

1. Terraced Field 梯田
2. Constructed Wetland 人工濕地
3. Ecopond 生態池
4. Green Corridor 綠色走廊
5. Herbs Spiral 香草螺旋塔
6. Water Wheel 水車
7. Ornamental Pond 觀賞池
8. Wind Turbine System 風力發電系統
9. Solar Energy System 太陽能系統
10. Vertical Green Wall 垂直綠化牆
11. Organic Farmlands 有機耕地
12. Composters 堆肥箱
13. Larval Host Plants 寄主植物
14. Rain Garden 雨水花園
15. Butterfly Garden 蝴蝶園
16. Pavilion 涼亭

Solar Power System 太陽能系統

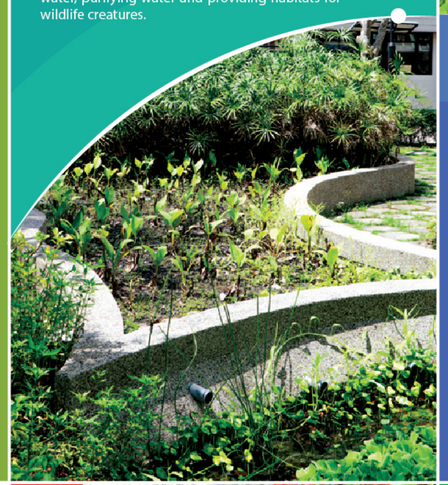
太陽是地球上最主要的能量來源。透過太陽能光伏板，我們可把陽光轉換成電能。在生態園內分別安裝了三款不同的太陽能光伏板，它們包括：單晶矽光伏板、多晶矽光伏板及薄膜光伏板。單晶矽太陽能電池由完整的矽晶體切片而成，普遍形狀為缺少四角的正方形。多晶矽光伏板則由細小及排列方向不一的矽晶體組成。薄膜光伏板在玻璃、金屬或塑膠物料之上沉積一層非晶矽或其他光伏材料的薄膜。

The Sun is the main energy source on Earth. Solar energy can be directly converted to electricity using photovoltaic (PV) panels. There are 3 types of PV panels installed in Ecogarden, they are mono-crystalline silicon solar panels, polycrystalline silicon solar panels and thin film solar panels. Mono-crystalline silicon solar panels are made from thin wafers sliced from homogeneous and unbroken silicon crystals. Polycrystalline silicon solar panels are composed of small pieces of silicon crystals aligned in different directions. Thin film solar panels are constructed by depositing a thin layer of amorphous silicon or other photovoltaic materials onto glass, metals or plastics.

Constructed Wetland 人工濕地

根據《國際濕地公約》，濕地是指無論是天然或人工的、永久或暫時的、靜止或流動的、淡水、鹹淡水或鹹水的沼澤地、泥沼、泥炭地或水域地。濕地佔地球表面面積6%，分散於全球不同的地域。濕地為我們帶來生態和經濟效益，並豐富了自然地貌，是地球上極為珍貴及重要的資源。它們對環境有著多重功能，例如儲水、淨化水質及為野生生物提供棲息地等。

The Ramsar Convention defines wetlands as "all areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish, or salty." Wetlands occupy about 6% of the earth's surface and they scattered as fragments. They are precious and important natural resources as they benefit the earth ecologically and economically, enriching the land feature. Wetlands have multiple functions for our environment such as storing water, purifying water and providing habitats for wildlife creatures.



Ecopond 生態池

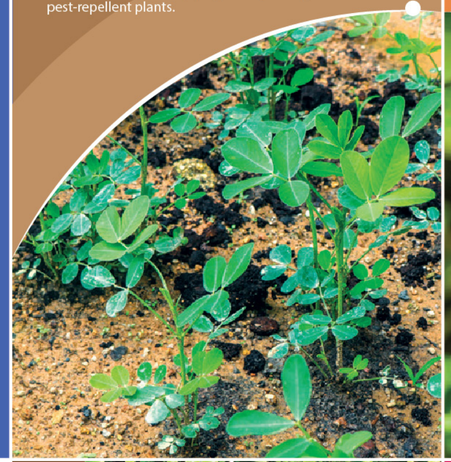
除了陸地生態，淡水生態亦透過興建生態池而完善了。該池塘具有很高的生態價值，因為它可以提供了多樣化的棲息地來支持不同生物。生態池上放置了卵石，並且栽種了不少水生植物。卵石之間的間隙為蝌蚪、蜻蜓和豆娘的幼蟲提供了良好的庇護所。一些如竹枝等的設備，是為成年蜻蜓停留休息而設置。

In additional to the terrestrial environment, the freshwater environment has been enhanced with aid of the Ecopond. This pond has a high ecological significance as it provided a diversified habitat to support different kinds of organisms. Pebbles were placed on the bed of the pond, and a number of aquatic plants have been being cultivated. The crevices between pebbles provide excellent shelters for tadpoles and larvae of dragonflies or damselflies. Some equipments, such as bamboo sticks, were set up for adult dragonflies to rest. A number of native wildlife species have been recorded in this pond. In addition, it is an excellent scenic spot for visitors, students and staff. Visitors could realize the importance of species diversity, as they might be able to recognize dragonflies with different colours or characteristics in a single pond.

Organic Farming 有機耕種

有機耕種，又被稱為生物農業或生物動力農業，是一種尊重環境生態的農業模式。這種耕種方式順 應自然生態，以有機肥料取代由石油副產品製成的化學肥料。因此，這種對環境友好的作業方式，能避免對環境及生態造成嚴重破壞。有機耕種的要素包括：拒絕使用化學肥料及農藥、拒絕使用基因改造的種子、適時種植、輪耕、間種及共生種植等。

Organic farming, which is often referred to as 'biological' or 'biodynamic' farming, is an agricultural method that respects the natural environment. It adopts practices that are based on ecological principles. For example, natural organic fertilizers are used instead of chemical products. It is known as an environmentally friendly approach that prevents devastating effects on the nearby environment or ecology. The characteristics and features of organic farming include refusing the use of chemical fertilizers and pesticides, refusing the use of genetically modified seeds, growing seasonal crops, crop rotation, intercropping and growing pest-repellent plants.

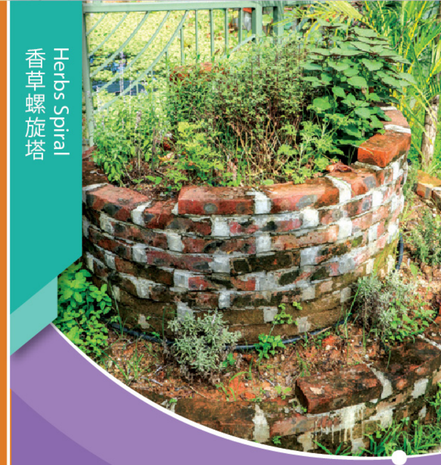


Butterfly Garden 蝴蝶園

為了在校園周圍吸引更多的蝴蝶，蝴蝶園內種植了不同類別的植物（寄主植物和蜜源植物）。由於空間的限制，灌木只能在特定區域栽種。然而，在相關的寄主和蜜源植物上分別可以找到一些蝴蝶的幼蟲和成蟲，而且持續的生態研究顯示這片花園的有效性，為校園增加了物種和遺傳多樣性。

The growing of selected plant species (host plants and nectar plants) aims at attracting more butterfly species around the campus. Due to limited space, only shrubs can be cultivated in the given area. However, a number of larvae and adults have been recorded on the corresponding host and nectar plant respectively. The continuous ecological survey demonstrated the effectiveness of this part of the garden, which enriched species and genetic diversity in our campus.

Herbs Spiral 香草螺旋塔



香草螺旋塔是一種利用重力的設計，頂部的土壤通常較乾燥，相反底部的土壤相對較濕潤，因為水會積聚在底部而形成濕氣區域。這個特別設計形成不同的物理環境，能讓各種各樣的香草能在不同的位置栽培。遮蔽環境可以在特定位置形成，提供生長環境給需要較少陽光的植物，形成微氣候。

The herbs spiral is a design that makes use of gravity. The soil at the top is usually comparatively drier and vice versa for the soil at the bottom, as water accumulates to form moisture zones. A great diversity of herbs can be cultivated in different positions due to differentiated physical environments. Shaded environments could be generated in particular positions for plants that require less sunlight, which demonstrates the capacity to produce different microclimates.

Amphibians 兩棲類動物

1. 沼蛙
   Günther's Frog *Hylarana guentheri*
   雄性求偶時會發出狗吠般的叫聲
   The mating calls of the males resembles a dog barking
2. 斑腿泛樹蛙
   Brown Tree Frog
   Polypedates megacephalus
   牠們的卵好像一團泡沫
   Their eggs look like a frothy mass
3. 黑眶蟾蜍
   Asian Common Toad
   Duttaphrynus melanostictus
   蟾蜍的皮膚比青蛙的乾燥及粗糙
   Compared with frogs, toads have dry and bumpy skin

Butterflies 蝴蝶

1. 裳鳳蝶
   Common Birdwing *Troides helena spilotia*
   受《野生動物保護條例》所保護
   Under the protection of "Wild Animals Protection Ordinance"
2. 寬邊黃粉蝶
   Common Grass Yellow *Eurema hecabe hecabe*
   幼蟲食用銀合歡的葉
   Caterpillars feed on the leaves of Leucaena leucocephala
3. 斐豹蛺蝶
   Indian Fritillary *Argyreus hyperbius hyperbius*
   具有雌雄二型的特質 — 雄性及雌性擁有不同的特徵
   Exhibit sexual dimorphism - male and female have different morphologies

Dragonflies 蜻蜓

1. 藍額疏脈蜻
   Blue Dasher
   Brachydiplax chalybea flavovittata
   身軀主要由藍、黃、黑三種顏色組成，並有一對綠色的大眼睛
   Have a pair of green eyes and a blue, yellow and black coloured body
2. 赤褐灰蜻
   Common Red Skimmer
   Orthetrum pruinosum neglectum
   擁有紫紅色的腹部及淡褐色的胸部
   Have a red-violet abdomen and a pale brown thorax
3. 曉褐蜻
   Crimson Dropwing *Trithemis aurora*
   雄性有著紫紅而鮮艷的身軀，雌性的身軀則以淡黃、黑和褐色為主
   The male has a brightly and scarlet red body. The female is decorated in light yellow, black and brown colours

Host plants 寄主植物

1. 鴨腳木
   Umbrella Tree *Schefflera heptaphylla*
   花蜜可製成冬蜜
   Nectar can be made into winter honey
2. 蘇鐵
   Sago Palm *Cycas revoluta*
   每三至四年才開花一次
   Bloom once every three to four years only
3. 細葉榕
   Chinese Banyan *Ficus microcarpa*
   在正常的枝幹上，會生長出很多向下垂的氣根
   Downward air roots will grow from normal branches

Nectar plants 蜜源植物

1. 龍船花
   Ixora *Ixora stricta*
   其果實是一些雀鳥的主要食物
   Some bird will feed on the fruits
2. 馬纓丹
   Common Lantana *Lantana camara*
   有毒植物，外來物種但已本土化
   Poisonous plant. Exotic but already localized
3. 三裂葉蟛蜞菊
   Bay Biscayne Creeping-oxeye
   Sphagneticola trilobata
   適應性強，能在各種土壤上生長
   Well adapt to different soil conditions

Aquatic plants 水生植物

1. 風車草
   Umbrella Plant *Cyperus involucratus*
   如果仔細觀察，會發現它們的莖是三角形的
   Have stems with triangular cross-sections
2. 荷花
   Indian Lotus *Nelumbo nucifera*
   屬於挺水植物，它們的葉會挺出水面
   Belong to emerged plant – their leaves are held well above the water surface
3. 睡蓮
   Water Lily *Nymphaea tetragona*
   屬於浮水植物，它們的葉浮在水面上
   Belong to floating plant – their leaves float on the water surface