

Food forest 食物森林

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Food forests, also known as forest gardens, are a creative and highly adaptable edible landscape design and management approach rooted in ancient and traditional cultivation systems, with many mature examples found throughout the world in a variety of climate settings. Depending on the locale and design specifics, they can effectively aid in addressing a wide range of environmental and social issues, such as food security, floods and droughts, biodiversity loss, soil erosion, pesticides, nutrient cycling, green waste management, and other urban development challenges, while also strengthening community resilience.

Perennial Crop Farming and Agroforestry Trends

The Green Revolution was a boon to developing countries because of the increases it afforded in agricultural production. More than six decades later, however, we are discovering that there has been a huge price to pay for industrial monoculture in terms of environmental degradation, erosion, soil degradation, water depletion and contamination, a loss of biodiversity, food safety as well as other social issues.

As the question of “how we get our food” comes into sharper focus for many people, those who are aware of the many serious issues created by industrial-style agriculture have sought out a

食物森林，或者森林食園，源自於遠古時代的傳統農業栽培法，是一種具有高度適應性的食用地景設計及管理法，於世界各地不同的氣候帶都能發現許多成功的範例，根據區域特性來加以應用，食物森林有助於解決很多環境及社會議題，譬如糧食安全、旱澇不均、生物多樣性喪失、土壤退化、農藥安全、農業廢棄物管理，以及其它都市發展問題，與此同時也增進人類社群的防災韌性。

多年生作物栽培及混農林業

60多年前起源自已開發國家的綠色革命，本意是為了供應大量的農場品，然而如今我們發現，採用單一栽培的工業化模式農作生產付出了巨額的環境成本，造成土壤退化、水資源的污染及枯竭、生物多樣性喪失、糧食安全等社會議題。

有志之士開始反省當今人類社會取得食物的方式，以及工業化生產食物所帶來的嚴重生態問題，開始尋求除了單一作物大量栽培以外、更為永續及符合生態的土地經營模式；世界各國興起了對多年生作物、混合栽培、混農林業、原住民傳統作物的興趣，因為這些古老的農業生產方式，很可能是目前所面臨的食物及環境危機(包含氣候變遷)的解決方法。

食物森林是一種混合栽培系統，在同一塊土地上栽培各種不同的作物來模擬多樣的自然環境；而工業化大量生產基本上只栽植單一作物，雖然可以有效率的獲取特定作物，然而這種耕作方式會消耗大量的石化能

path away from overly simplistic yield-boosting monoculture approaches to more sustainable and resilient food production systems and ecological land stewardship models. Perennial polyculture farming, traditional indigenous cultivation practices and agroforestry have all gained new attention as the source of solutions to address a wide range of food and environmental issues, including climate change mitigation and adaptation, in countries around the world.

Food forests are a kind of polyculture that uses multiple crops in the same space mimicking the diversity of natural ecosystems. Most large-scale industrial farming is monoculture. Although it produces an abundance of a particular crop, it requires lots of inputs in the form of petrochemical-based energy, pesticides and fertilizers, while also requiring irrigation and reducing biodiversity. Polyculture, by contrast, means all the crops are cultivated in one place, so less land, water and energy are needed for production and maintenance.

The recent popularity of food forests among the public, especially in the urban context, can be traced more specifically to the rise of a holistic ecological design science known as Permaculture. Co-created by Bill Mollison and David Holmgren in the 1970s, Permaculture is a creative design process based on whole-systems thinking and eco-centric ethics and design principles. This approach guides Permaculture designers to mimic the patterns and relationships in nature and can be applied to all aspects of

源、農藥及肥料，需要建設灌溉系統並減低生物多樣性；相反的，混合栽培則不需要大面積的土地、水資源及能源來維護及生產。

食物森林所造成的風潮，尤其是在都會區，可以追溯到1970年代樸門主義的興起，發起人是莫里森及洪葛蘭，樸門是一種基於生態原則、考量整體生態系統的設計原則，樸門的設計者模擬自然界的運作方式及物種關係，運用至任何形式的人類居住環境，特別是農作物生產及土地經營管理方面。

食物森林可視為樸門哲學的體現，其目的在於創造一個自我維持且有益於生態的系統，並提供家庭或社群所需的食物及日用品，建立好的食物森林隨著時間而成熟，日久能提供更多的產出而減少維護成本。

更進一步的定義，食物森林應該是一個複合的、充滿層次的食物網絡，裡面的成員，包含可食及多年生作物、喬木和動物等，其存在的目的在於提供其他成員或整體



Capture of a food forest abutting an artificial wetland environment at Djanbung Gardens designed by Robyn Francis of Permaculture College Australia.

位於鴨嘴獸農園、由澳洲樸門學院的Robyn Francis所設計的食物森林與人工濕地。



This artificial wetland environment surrounded by a food forest at Djanbung Gardens is an oasis of ecological diversity as well as drought resilience planning.

鴨嘴獸農園裡的人工濕地，不但是復育生物多樣性的綠洲，且具有抗旱防澇的功能。

human habitation with particular emphasis on agriculture and landscape management.

Food forests are the embodiment of a form of applied Permaculture that aims to create a fully functioning, self-regulating and ecologically beneficial ecosystem which also provides a significant proportion of a homestead's or community's food and other needs. Over time, as a food forest becomes established, it requires less maintenance but gives greater yields.

More specifically defined, food forests are dense, highly “stacked” assemblies of edible and useful trees and perennial plants as well as

系統的需要，也因此，食物森林能在提供產出的同時，減少維護所需投入的外在能源並保持一定的系統韌性。除了提供人類所需的水果及根莖作物，食物森林還有一個更高的目標就是盡可能使用小面積的土地來滿足人類所需，為了滿足這個目標，必須透過精心的設計、考量系統中各成員的相互關係，也就是樸門農法中所強調的「層次」概念，以建立更具韌性的生產單位。

願景與目標

設計食物森林的第一步，是了解擁有者及他們之間和土地的關係。身為關鍵的經營

animals and the soil food web, wherein the needs of each member of the assembly are met by other members or aspects of the whole. Thus, the resulting food forest ecosystem develops in such a way that requires increasingly less human or outside inputs while progressively increasing the collective yields and overall resilience of the food production system. Instead of increasing the yield of a given fruit or root crop, while still important, a higher goal of the overall food forest system is to meet as many human needs as possible using the least amount of land given to the task. This approach to increasing yields and functions through careful consideration of how all the elements within a given system are related is what Permaculture designers refer to as “stacking” and creates greater overall resilience.

Vision and Goals

Knowing for whom the food forest is being created, i.e. people, and their relationship to the place where it will be established is foremost. As key stakeholders, these people will often have ideas and feelings about the project, but sometimes lack the experience or skills to articulate them. Like most design endeavors, especially for more long-term projects, a comprehensive vision and well-articulated goals are essential to the creative and decision-making process, however. The designer can present different ideas or themes, such as a children’s learning food forest, a fragrant food forest or guilds, a wildlife habitat friendly food forest – the possibilities are limitless

者，必然已經具有對該計畫的感覺及想像，往往缺乏的是足夠的經驗及技術來執行。而一個可長可久的專案，在作任何創作及決策的前提即是周詳的願景及明確的目標，設計者當然可以提出不同的想法跟建議，譬如提供教學用的食物森林、香料森林、市民農園、提供野生動物棲地的農園等等，可能性是無限的，試著整合經營者的意見，以形成明確的願景和目標，設計者可藉由明確的目標，幫助未來的經營者更加了解本地食物森林的環境，且專注於達成目標的行動和方法。

觀察與互動

樸門設計的獨特之處在於對一個基地在設計與實際使用之前，必須從事一段時間(最好是一年)的環境觀察，以了解該基地的特性。觀察方式採2種非常不同的型式，一是客觀的不帶有任何前提的觀察和記錄，另一種型式則是根據經營者的目標、針對某些環境參數來作記錄，譬如水資源的動向、降雨型式、風的流向、汙染(空氣或噪音等)的來源、土壤質地、植被與喬木，或現有建物，其它還包含人們與本基地的互動現狀，或出現的動物種類等等。

微氣候

在臺灣，除了從北部潮濕的亞熱帶到南部乾濕季分明的熱帶氣候變化，由於地型及季節風的影響，各地區常擁有獨特的微氣候，也因此必須依照地區特性來選擇適當的樹種。此外，山地及丘陵區域，還必須將坡度及坡向列入考量，這些因子影響了陽光及能源(如水分)的移動方向，決定用以捕捉或施

- and listen to their feedback and then synthesize a vision and goals. With a clear vision and aims, the designer can help the stakeholders to better “see” the food forest environment that they seek to manifest and then focus more precisely on those actions that will make it happen.

Observe and Interact

Perhaps unique to the Permaculture design process is the emphasis on observing and engaging with the environment of a proposed site for an extended period of time, preferably a full year, to read the landscape and to learn as much about the site prior to actual design. Observation takes two distinct forms: 1) observing with an open, non-judgmental awareness wherein phenomena is simply noticed and recorded; and 2) observing with an intention or goal to learn specific information about a site and its environment, such as how water flows, what the rainfall patterns are, how the winds blow, where the air/noise pollution, etc. come from, soil condition, existing vegetation and trees, building structures (if any), how people currently interact with the site, and animal presence/impacts, access to and within the site.

Microclimates

In Taiwan, which spans the humid subtropics of the north to the wet/dry tropical climates of the south and has many unique microclimates due to topography and the intersection of larger climate patterns, the selected trees will be project and site



A relatively young food forest created on an abandoned cropping terrace located on slope land with guava, lemon, mulberry, and banana forming the main canopy fruit trees.

這是一座位於荒廢梯田、初期階段的食物森林，由芭樂、檸檬、桑葚和香蕉作為上層樹種。

加能源的設計思考。選擇的喬木樹種將會主宰整個食物森林群落的空間配置，影響伴生植物及鄰近樹種的選擇。

問題即解答

樸門設計的另一個獨特之處則是將一般人視為麻煩的問題當作解答，執行方式則如前所述，農園基地在設計前所進行的客觀觀察過程，如果習慣性的採用2分法處理事物，其實很有可能錯過許多創意的發想。也因此，設計者的挑戰乃是如何以不同的面向來思考“麻煩問題”，進而加以利用生產。譬如一個泥濘的、排水不良的基地，或許不適合建造成一個傳統的果園，但如果設計成水生池搭配多年生水生作物，或是香蕉為主的農園，則變成絕佳的地點。

從型式到細節

有一點要格外注意的是，在貿然投入食

specific. Moreover, mountainous or hilly land forms require land-use planning that takes aspect and slope into careful consideration, as the two have the greatest impact on available sunlight and movement up (expended energy required) or down (potential energy to catch, including from the movement of water). The selected target canopy species will dictate the basic dimensions and spacing within a guild during the stages of growth. It will also inform the companion planting scheme, elaborated below, of the canopy tree's neighbors.

The Problem is the Solution

Another unique aspect of Permaculture design is the attitudinal principle of “the problem is the solution,” which is closely linked to the aforementioned non-judgmental observation process. The habit of seeing every phenomenon in terms of good or bad can result in missing out on many creative opportunities. Thus, the designer is challenged to see how a “problem” can be seen from a different perspective and how it can be productively utilized. A boggy, poor-draining spot in a project area, for example, might pose a challenge for a conventional fruit tree planting, but perhaps it is an excellent spot for a small pond with perennial water crops or a banana-tree dominant cultivation scheme.

Design from Patterns to Details

Another Permaculture design principle which encourages people to keep the whole in mind before jumping into the details of specific



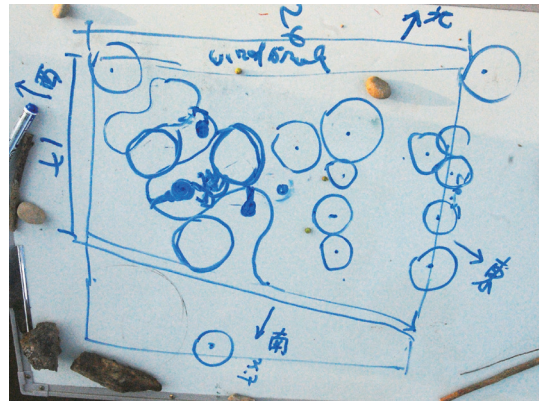
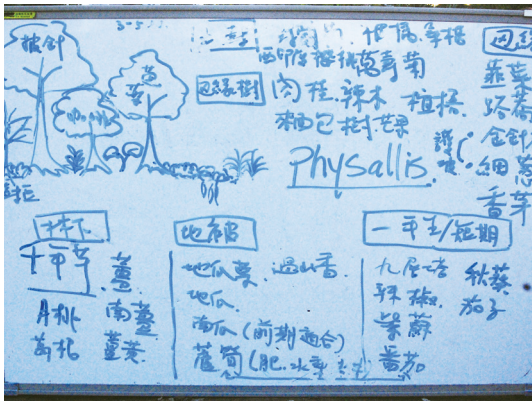
Banana circles, a highly stacked guild of banana and other plants surround a pit used for turning compost and organic matter and excessive water into a productive food system, is an excellent example of many Permaculture design principles, especially “The Problem is the Solution.”

香蕉圈是樸門典型將問題視為解答的範例，將環繞香蕉等多層次植物的窪地作為拋棄農業廢棄物及過濾汗水的地方，以建立富含生產力的農園。

物森林的細節設計之前，要統合之前所收集的詳細觀查資料、計畫目標與願景，先描繪出農園的大綱。參考這些資料，確立土地利用型式之後，才能進行細節的設計，如此才能確保農園的各部分組成是彼此相關也互相支援的。

食物森林的混栽系統與群落設計

應用生態學的原理，樸門選擇樹種及其它植物來建立所謂的「群落」，與植物社群的意義接近，群落內的成員實際上分屬於不同的層次及功能，隨著群落發展的演替，群落成員包含上層喬木、中層喬木、灌木、草本層、地被層、藤本及根莖作物等面積也隨之變化，群落植物的選擇基於特定的需求、群落的結構、設定的生產量、功能及物種之間的互動關係，如同食物鏈一般，增加栽培的物種多樣性與物種之間的相關性，可以加強食物森林的韌性。



(left) A guild-building exercise that was produced through collaboration with community supporters of the Yonghe Community College Food Forest project in northern Taiwan. (right) A patterning exercise that was produced with community supporters of the Yonghe Community College Food Forest project in northern Taiwan.

(左)永和社大社員針對食物森林所作的共同設計作業。(右)永和社大的食物森林初步設計圖。

parts of the design - having extensively observed the site and taken in various information about a proposed food forest site, coupled with the vision and aims for the project, an outline of potential land-use patterns will emerge. With the proposed land-use pattern designated, siting the food forest and other desired elements of the master plan fall into place and the task of fleshing out the details of each area can begin. Working from pattern to details ensures that all the parts of the site are well-integrated and mutually support each other.

Food Forest Polyculture and Guild Design

Using concepts in ecology, Permaculture practitioners select tree and plant species to form what we call “guilds”, similar to plant communities, but whose members take up physical layers and other functional niches. The development process includes different stages

群落的設計始於選擇上層喬木樹種，也決定食物森林的成熟期，大部份熱帶及亞熱帶的果樹，如芒果、酪梨、波羅蜜、麵包樹、芭樂、葡萄柚、龍眼、荔枝、李、梨及柿樹都很適合，南部可以種植一些堅果作物，像夏威夷豆(澳洲胡桃)，或甚至腰果。其它堅果例如核桃、板櫟、榛果、胡桃，或杏桃、蘋果、梨、櫻桃等果樹，則比較適合溫帶氣候。

林下作物的選擇除了食用或藥用(根、莖、葉、果實、種子)以外，也要考量其它的特性和功能，譬如伴生植物(對其它植物生長有益者)、誘蝶或蜜源植物、驅蟲植物、吸引野生動物、固氮、生質能源、吸附重金屬或礦物質、球莖或根系強健(促進土壤通氣)、薪炭材(萌蘖或天然修枝)、樹牆、綠籬、草毯、土壤覆蓋、肥力或堆肥、飼料或放牧等等。

伴生(共榮)植物

伴生種植是很多有機或自然農法常用的栽培技巧，藉由混栽某些植物來達到互益的

of succession, with the amount of area of the plants within the guild at each stage changing as the canopy, subcanopy, shrub, herbaceous layers, ground covers, vines, roots, etc. grow and fill out the system. Selection and placement of each plant is contingent upon its particular needs within the guild's structure and its desired yields, functions and interactions with other guild members. System resilience is cultivated through increasing the number of relationships between all the members of the food forest in much the same sense as ecosystem food webs.

The designing of specific guilds starts first with deciding what the desired target canopy species will be when the food forest system matures. This could be one of the many fruit trees grown in the subtropics and tropics, such as mango, avocado, jackfruit, breadfruit, guava, pomelo, longan, lychee, plum, Asian pear, persimmon, etc. A few nut trees, such as macadamia or even cashew in the south, could be selected as well. Nut trees like walnut, oak (acorn), hickory, chestnut, etc. and fruit trees such as apricots, apple, pear, cherry, etc. are better suited to places with more temperate climates.

Understory trees and plants are also selected not only because of their usefulness as a food or medicine (roots, shoots, leaves, fruit, seed etc.), but also because they have other characteristics, functions or yields, such as companion plants (plants that have an overall benefit to one another), insectary and nectary plants, aromatic pest confusers, wildlife plants, nitrogen-fixing



Demonstration of traditional polyculture approach to cultivating annual as well as perennial crops by the Amis community of Kalala in Hualien, Taiwan.

花蓮阿美族迦納納部落的傳統作物(一年生與多年生)混栽範例。

功能。在食物森林設計裡，伴生作物通常被栽植在喬木底下，有助於驅逐害蟲、或吸引某些有益的昆蟲像蜜蜂或螳螂等等，或藉由固氮、田間覆蓋或堆肥的型式來增加土壤肥力。伴生作物的選擇性很多，如忌避香料植物：蔥、蒜、洋蔥、萬壽菊、羅勒、三色堇、金蓮花、蒔蘿、鼠尾草、薄荷、迷迭香、芸香、艾草、百里香、薰衣草、蕁麻等等。金蓮花是有名的誘引植物，可以誘引蚜蟲以減少其它作物受害。還有一些植物可以吸引害蟲天敵的，如茴香、香芹、歐防風、香雪球、香薄荷等等。而藉由覆蓋及固氮來增加土壤肥力的作物有：琉璃苣、康復力、羽扇豆、苜蓿、豌豆等豆科作物等等。

豆科及固氮植物

在設計食物森林時，值得多花點時間來考量固氮樹種(例如豆科作物)。植物的生長需要適度的微量元素，在大部分的原生環境中，

plants, biomass producers, dynamic accumulators, bulbs and large rooted plants (aerating the soil). pollarding / coppicing, espalier, hedge or thicket plants, ground cover plants, fertility and mulch plants, animal forage and fodder plants.

Companion Planting

A concept known to many organic farmers and eco-minded gardeners, companion planting is the practice of placing certain species of plants together with reference to known or observed effects on each other. In a food forest design, companion plants are often planted under trees, helping them to repel pests, attract beneficial insects like bees and praying mantises, and to add nutrients to the soil via nitrogen fixation or in the form of mulch and compost added by decaying matter or roots. There is a great variety of companion plants to choose from to plant under trees. Many companion plants are used to repel pests like chives, garlic, onion, marigolds, basil, tansy, pansy, nasturtiums, dill, sage, mint species, rosemary, rue, mugwort, thyme, lavender, nettle and many more. Nasturtiums are also an example of a kind of trap plant, which lures away aphids from other plants. Plants that attract beneficial insects preying on pests like fennel, angelica, parsley, parsnips, sweet alyssum, bee balm and so on. Borage, comfrey, lupins, clover, peas, beans, etc. are some of the plants adding nutrients to the soil through decaying mulch and roots or by way of nitrogen fixation making it available to the trees in the soil.

豆科和某些特定植物和土壤中的固氮菌存在著共生關係，形成根瘤，以便將空氣中的氮素轉換成植物可利用的型式，也因此食物森林裡、原生固氮植物的地位，和能提供食物生產、或前文提到的其它功能作物一樣重要。

食物森林裡的動物

雖然食物森林一般來說面積並不大，但適度的在裡面放養家畜(尤其是雞鴨)，有助於維護管理農園，透過細心的照料，動物可以提供許多服務，例如除蟲和蝸牛；除了家畜以外，野生動物，例如某些無毒蛇類，也能幫助農園解決鼠類造成的問題。

整地—收集與貯藏水

樸門設計在開始種植食物森林之前，通常會先進行一些水資源管理的大地工程，以收集貯藏雨季的雨水來度過乾季，並避免過度沖蝕。考量坡度、土壤及降雨特性，適度的沿著等高線挖掘一些截流溝及土堤，可以進行被動式的灌溉、截流富含養份的逕流水，以及幫助水資源更均勻的分布在農園。能因此更容易的控制逕流水，導引至蓄水池或排出農園。大約在70年前，澳洲人P.A. Yeoman就發表了關鍵線設計，對某些大型地景設計是很有用的參考資料。

土壤復育與田間覆蓋

成功建造一座生生不息食物森林、其關鍵是健康的土壤，以及多樣化的土壤食物鏈，確保其中的養份能有效率的循環。創造這樣的條件始於多樣化的食物來源，也就是在農園中栽植多樣化的植物。種植蔓生作物或使用

Leguminous and Nitrogen-fixing Plants

Leguminous and nitrogen-fixing plants deserve special attention when designing a food forest guild. Plants need adequate amounts of the macronutrient nitrogen for growth and leaf production. In most natural landscapes, leguminous and some other kinds of plants have a symbiotic relationship with nitrogen-fixing bacteria in the soil that attaches itself to the plant's roots forming nodules where nitrogen from the air is turned into a form usable by plants. Native nitrogen-fixing trees or shrubs that are already valued as useful species in terms of food (for people or animals) or other characteristic as mentioned above are particularly important as they will support the growth and long-term health of the target fruit-producing trees.

Animals in the Food Forest

Depending on the size of the food forest, smaller domesticated animals, particularly chickens and ducks but also other smaller animals raised for food, can be put to work to help with maintenance, utilizing the animal's natural biological functions, such as insect and snail eating, through a careful and ethical management strategy. Domesticated species are not the only animals that you will want in the edible forest garden, however. Many kinds of wildlife, including non-poisonous species of snakes, provide other services, such as rodent population control, for example.

植物的枯落物當作田間覆蓋，可以阻絕大雨的沖刷、保持土壤濕度，還是土壤裡微生物的有機質來源。因此食物森林裡可以種植一些提供落葉的植物、葉子大的植物如康復力，或多年生作物蔓花生來覆蓋地表、修剪枝葉提供田間覆蓋。長效性的基肥則可以利用浸泡過尿或堆肥液的生物炭，埋在土中的生物炭可以維持上千年，提供植物所需的必要養分如氮跟磷，過去的研究指出，施加生物炭及其它的肥料，能夠顯著的提高作物產量，在亞馬遜盆地裡，生物炭添加的土地當的人稱之為terra preta，是已經奉行了數百年的傳統農法。

都會區裡的食物森林

食物森林在全世界的傳統部落是很常見的生產食物及土地管理方法，已知最古老的食物森林已經存在上千年了，與那些同樣古老的文化共存。然而隨著近代生態農業運動的復興，我們也能找到一些現代的例子。

隨著樸門設計的引入，食物森林成為眾多城鄉區域的樸門奉行著、其居住單元裡的必要成分，然而高度的都市化後，目前全世界50%的人口居住在都市區域，同時也產生了諸多環境及糧食安全問題，也因此，重新塑造人與環境關係的社區再造運動日亦重要，隨著世界性的社區再造運動，食物森林也因此蓬勃了起來。城鄉區域食物森林的興起，滿足了廣泛的社會及環境上的需求，並提供無可取代的生態與糧食生產的教育功能。

最著名的例子之一是位於華盛頓州西雅圖的「信標食物森林樸門計畫」，這是一個由地方政府跟社區共同設計與營造的成功範例：一個7公頃的食物森林及可食地景，信標



Sheet mulching around existing trees at Yonghe Community College Food to build soil and preparation for additional plants to be added to the understory.

永和社大的農園使用紙箱等田間覆蓋物，以保護土壤，並作為日後增加林下作物的準備。

Land Preparation – Earthworks and Water harvesting in the Landscape

When preparing a site for a food forest, permaculture practitioners usually design earthworks to store rainwater in the soil for the dry season and catch rainwater in the wet season without everything washing away. This means using swales and berms dug on-contour with spacing that takes slope, soil and rainfall conditions into consideration. This kind of earthwork provides many benefits in terms of passive irrigation, capturing downslope fertility flows, and bringing water more evenly across the landscape. Run-off can also be more easily controlled and directed toward retention ponds or off-site in a responsible manner. Keyline design, a

食物森林計畫成為國際焦點的原因、主要在於成功的社群推廣教育，州政府的目標是設計並栽植一個都會區食物森林，以鼓勵民眾共同管理與收穫、並復育區域的生態系，進一步將公有土地再造成為可食的森林生態系、減輕農業活動所造成的氣候衝擊、改善區域糧食安全、提供教育機會，使生產食物成為全民共享(包含其它物種)的盛事。

受到諸如西雅圖的食物森林計畫的啟發，如今在臺灣，食物森林與可食地景已是快速發展的社會運動。都會區居民渴望與自然環境重建親密關係，並生產自己的食物，促使都市發展政策釋出更多的公有土地，並支助社區農業營造計畫。然而非政府組織與社區大學在推廣這類計畫時所面臨最大的問題在於土地取得。目前臺灣大部分的食物森林位於私人土地或原住民部落，城鄉區域的

method of land preparation for farming invented by P.A. Yeoman (Australia) nearly 70 years ago, is a useful reference for larger site projects.

Soil Building and Mulches

A key aspect of regenerative agriculture and food forestry focuses on building healthy soils and creating conditions that ensure a diverse soil food web and the cycling of nutrients in the cultivated environment. To create such conditions, we start by having diverse food sources, which means diverse plants in the landscape. Mulches, in the form of dead plant material or living cover crops, provide protection to the soil from heavy rains, help retain soil moisture in dry conditions and is a source of organic matter for soil microbes. Food forest design thus emphasizes plants that can be grown to supply mulch in the form of fallen leaves, large-leaved plants, such as comfrey, or groundcovers, such as perennial peanut, that can be cut down and dropped on the ground occasionally and still regenerate. For a long-term nutrient source for a system's plants, biochar that has been soaked in a nitrogen-rich solution such as urine or compost tea can be buried in the soil when preparing the site. Biochar will last in the soil for thousands of years, and increases available nitrogen, phosphorus, and other essential plant nutrients. Some studies suggest biochar amendments coupled with other fertilization methods increase yields significantly. The Amazon basin has many sites of biochar-amended earth (called terra preta) from hundreds of years ago.

新專案仍方興未艾。位於新店溪的洪氾區、由筆者主導設計與新北市政府所支助的、永和社大食物森林計畫，目前已經完成設計，透過社大的教育系統及志工的投入，本計畫將會採用樸門的設計原則，特別針對目前氣候變遷的現狀，來建立一個具應變力且富含生態教育與生產功能的食物森林。

進階閱讀

The Permaculture: A Designer's Manual by Bill Mollison (書籍)

Edible Forest Gardens by David Jacke and Eric Toensmeier (書籍)

Practical Permaculture for Home Landscapes, Your Community, and the Whole Earth by Jessi Bloom and Dave Boehnlein (書籍)

Permaculture Magazine, U.K. (雜誌)

Resilience.org Website (網站)

作者簡介

Tammy Turner (唐敏)，樸門教育家與設計者，自1986年由美國來到臺灣定居，是知名的翻譯人，同時也成為精粹有限公司的創辦人之一和資深合夥人，精粹公司是頗受各界肯定的多國語言媒體服務機構，一直廣泛的與各層級公、私機構協作，早年受教於加州大學的生物學背景、及多年來旅行世界各地原住民部落的經驗，啟發她於2007年成為樸門設計師，師承著名的澳洲樸門設計者 Robyn Francis 和 Geoff Lawton、以及澳地利的 Sepp Holzer，唐敏這幾年來主導並設計許多在臺灣、中國、印度及美國的社區營造可食地景與食物森林專案。

Food forests in the Urban Landscapes

Food forests were and continue to be a frequently used food production and land management approach in traditional settlements and communities around the world. The oldest food forests known range from several hundred to several thousand year old cultivated environments, particularly in places with enduring cultural continuity of similar longevity. However, with their revival as part of ecological farming and gardening in more modern times, we can also find many recent examples.

Since the advent of Permaculture design education, food forests have become part and parcel of many permaculture practitioners' homesteads in rural and suburban settings. However, environmental and food security issues in urban environments have expanded as a result of increased urbanization with 50% of world's population now living in urban areas. For this reason, community building has taken on an increasingly important role in creating new relationships between people and the physical space of the urban environment. It is through urban community building initiatives worldwide that food forestry has begun to take root and grow. These urban food forest initiatives serve a wide-range of social and environmental needs and provide an indispensable educational function in providing accessible spaces for learning about the many aspects of ecology and food production.

One of the most well-known urban

projects is the Beacon Food Forest Permaculture Project in Seattle, Washington. An example of successful community and local government cooperation to develop a 7-acre public park into a collaboratively designed and implemented food forest and edible landscape, the Beacon Food Forest project has garnered a great deal of attention worldwide particularly for its community outreach and education. The stated goal of the Beacon Food Forest is to design, plant and grow an edible urban forest garden that inspires its community to gather together, grow its own food and rehabilitate its local ecosystem. They also work to regenerate public land into an edible forest ecosystem, reduce agricultural climate impact, improve its local food security, provide educational opportunities, and celebrate growing food for the benefit of all species.

In Taiwan, food forestry and edible landscaping is a fast-growing social movement fueled by successful stories such as the Seattle-based Beacon Food Forest project. The growing desire of urban residents to reconnect with the natural environment and grow their own food has become the major driver of new urban development policies that provide space in public lands and/or funding for community-based urban agriculture projects. NGOs and community colleges have spearheaded such projects with varying degrees of success with the greatest challenges coming from sustaining access to land. Currently, most food forests exist on private land or in traditional indigenous communities in Taiwan.

New projects in urban environments, however, are underway. The Yonghe Community College Food Forest project, with the support of New Taipei City government, has already moved through the design phase and is currently being implemented through a combination of community education and volunteer efforts. Located at the edge of the Xindian River's flood zone, the project will model Permaculture design principles and technologies to create a highly adaptable environment for food production and community ecological education with a special focus on climate change.

References:

Permaculture: A Designer's Manual by Bill Mollison

Edible Forest Gardens by David Jacke and Eric Toensmeier

Practical Permaculture for Home Landscapes, Your Community, and the Whole Earth by Jessi Bloom and Dave Boehnlein

Permaculture Magazine, U.K.

Resilience.org Website

About the Author

Tammy Turner is a Permaculture Designer and Educator and founder of Ziran Permaculture Design. A long-time resident of Taiwan originally from the U.S., Ms. Turner has lived and worked in northern Taiwan since 1986. She is also a principle of Pristine Communications, a multilingual social enterprise that works closely with Taiwan's civil society and government

agencies. Travel to traditional communities around the world and an enduring fascination for the natural environment since her early days studying biology at the University of California, Irvine inspired her to become a Permaculture designer in 2007. She has received training from renowned Permaculture designers and educators Robyn Francis and Geoff Lawton from Australia and Sepp Holzer from Austria and is the lead designer and main educator for a wide range of community-based food forest and edible landscape projects in Taiwan, China, India and the United States.