Article

Establishment of a Sustainable Management Model for Chinese Herbal Garden in an Urban City—Hong Kong

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Abstract: Chinese medicinal herbs (CMHs) have been used for thousands of years because of their significant properties regarding the prevention and treatment of diseases, such as COVID-19. There is an increasingly diminishing supply of wild medicinal resources, and the demand is greater than the supply. Ecological balance and the conservation of natural Chinese medicinal herbs are serious issues in sustainable development, which requires the minimum requirements to be met without compromising the resources of future generations, especially with respect to the maintenance of production and consumption as well as the quality control of CMHs. Hong Kong is an urban business city, busy with work and the fast pace of life. The sustainable development of CMHs is difficult in a huge population situated in an area with very scarce land coverage. The conservation of CMHs in urban horticulture is extremely neglected because people lack living space; for example, Aquilaria Sinensis (the incense tree), also called “pak muk heung” in Cantonese, was an indigenous species that was illegally logged in the past. This led to detrimental effects on the population density and genetic diversity of the species. There is no doubt that Hong Kong is required to set up a management model in community facilities for these emerging modern social configurations, such as building a Chinese herbal garden for the conservation and promotion of a healthy urban environment and giving people a chance to gain more information on CMHs. The current study employed problem analysis and strategic decisions for the sustainable development of 62 kinds of CMHs in a Chinese herbal garden, which converged with some medicinal itineraries of Lingnan herbal medications, and implemented a theoretical framework of management models for ten secondary schools, e.g., the Aroma garden of the L’Occitane at the Technological and Higher Education Institute of Hong Kong (THEi) Tsing Yi campus and Land from the Far East Consortium International Limited in Sai Kung Pak Kong. In the present original article, we would like to establish a sustainable management model for Chinese herbal gardens in an urban city. The sustainable development model for the Chinese herbal gardens is based on five major aspects: (1) land resources, (2) manpower planning, (3) economy, (4) education or training, and (5) ecosystem (cultivation). These are the essential factors of management and are implemented in our Chinese herbal gardens. We aim to find a suitable management model for Chinese herbal gardens and to promote it in other urban cities.

Keywords: management model; Chinese Herbal Garden; sustainability; Hong Kong; urban city

1. Introduction

Chinese medicinal herbs (CMHs) have been used for a long time in China. Since the Qin and Han dynasties (221 BC–220 AD), the ancients discovered that many plants grown in nature have medicinal values and recorded them in “Shennong Ben Cao Jing” [1]. This contains 365 kinds of CMHs, in which more than 100 types of CMHs are listed as “high quality”, “non-toxic”, and “tonifying CMHs”, and used to strengthen the body’s
immune system [2]. “The Complete Collection of Traditional Texts on Chinese Materia Medica” is the most updated version, which was published by the Association of Chinese Culture Research. It includes 800 types of CMHs with 410 volumes and 246,000 pages, but “Shennong Ben Cao Jing” is still an important part of China’s cultural heritage; it represents centuries of accumulated wisdom in combating disease and preserving health [3].

Hong Kong has been stricken by severe acute respiratory syndrome (SARS) and the COVID-19 pandemic in the last three years [4]. Some Chinese medicinal herbs are applied for the prevention and treatment of COVID-19, such as Glycyrrhizae Radix et Rhizoma [5], Astragali Radix [6], Houttuyniae Herba [7], and Isatidis Radix [8]. These CMHs possess wide pharmaceutical activities, including anti-viral, anti-bacterial, and anti-inflammatory properties [5–8]. As wild medicinal resources become increasingly scarce, the demand has become greater than the supply. People cannot buy CMHs for preventing and curing COVID-19 [9]. CMHs are still the mainstay for about 75 to 80% of the world’s population—especially in developing countries—for primary health care with better cultural acceptability, better compatibility with the human body, and reduced side effects [10]. The World Health Organization (WHO) recently released the “WHO Expert Evaluation Meeting on Chinese Medicine Treatment of COVID-19” under the relevant section of its official website, which affirmed CMHs’ safety and effectiveness. Therefore, the supply of CMHs in the world has decreased, and the demand has proportionally increased.

Aquilaria sinensis (Lour.) Gilg is an indigenous species that was illegally logged in the past as an economically important evergreen tree species and a source of agarwood, which is used for incense and as a uniquely precious medicine for treating depression [11]. The volatile oil of Aquilaria sinensis (Lour.) Gilg has been shown to have good pharmacological activities towards the central nervous system (CNS) and the levels of adrenocorticotropic hormone and corticosterone in serum, as well as the expression of corticotropin-releasing hormone mRNA in the hypothalamus, which indicates the regulation of the over-activation of the hypothalamic–pituitary–adrenal (HPA) axis [12]. Thus, there is a high market demand for agarwood, and this species is heavily overexploited in the wild [13,14]. Basically, sustainable development is required “to meet some needs of the present without compromising the ability of future generations to meet their own needs. It advocates the idea of sustainable growth, and it must take into account the social and economic factors as well as the ecological system”, according to the International Union for the Conservation of Nature and Natural Resources (IUCN) [15]. As sustainable development is a global concern, it is being brought into more public policies and facilities that face a most difficult task, especially in some developed countries and urban city, such as Hong Kong. We lack natural resources, e.g., land, and environmental protection-based knowledge. The economy is also a prerequisite condition in society. It is quite hard to maintain a Chinese herbal garden in an urban city.

Furthermore, CMHs should be ecologically balanced and conservation measures should be employed on their behalf in accordance with sustainable development. Previously, scientists’ thoughts focused on the sustainable development of the Chinese medicinal industry with respect to the “high concept” era in order for human society to rationalize the standard management systems and increase the industry-consolidation layout [16]. Besides this, the application of sustainable practices could be applied in the Belt and Road Initiative’s trade of traditional Chinese medicine. Cultural exchange with other Belt and Road Initiative (BRI) countries, as a result, increases the degree of cooperation in the marketing, registration, and promotion of CMHs or traditional Chinese medicine (TCM) products [17]. However, these types of sustainable development are mainly implemented in industry and foreign policy.

Therefore, our research focuses on small-scale sustainable development, which is quite different from past studies. It involves five major areas: (1) land resources, (2) manpower planning, (3) the economy, (4) education or training, and (5) the ecosystem (cultivation). This scheme is employed in order to set up a management model in the community facilities and build a Chinese herbal garden for the conservation of 62 kinds of CMHs, as well as
promote healthy urban environment and give people, including secondary school students, a chance to learn and understand more about CMHs.

2. Methods

This research project used problem analysis and strategic decisions to develop a plan for the sustainable development of 62 kinds of CMHs in a Chinese Herbal Garden (Table 1) [18] and implemented a theoretical framework of management models. These 62 CMHs are longevity plants, which have a shortened growth period and are suitable for Hong Kong’s weather and used as raw materials in Chinese “Herbal Tea”.

Table 1. The 62 kinds of CMHs in a Chinese herbal garden.
| Woody Species |
|----------------|
| **Species (Latin Name)** | **English Name** | **Major Function(s)** | **Growth Environment(s)** |
| **Liquidambar formosana** Hance | Sweet Gum | **Jaffaite (Fengxiangzhi):** Boots blood levels, relieves pain, remove toxin, muscle stimulant, cools blood, and stops bleeding. **Mature infructescence (Luluton):** Dispels wind, frees network vessels, promotes urination, and frees blood channels. | Grows in sunny areas, villages, montane ever-green forests, and broad-leaf forests. |
| **Choerospondias axillaris** (Roxb.) Burtt et Hill | Hog Plum | **Bark (Wuyanguoshupi):** Clears heat, detoxification, and antiparasitic. **Fruit (fresh) or kernel (Nansuanzao):** Move qi, invigorates blood, nourishes the heart and calms the spirits, reduces accumulations, detoxification. | Grows on hill slopes at altitudes 300–2000 m, in hilly areas, or ravine forests. Grows well in sunshine, and can be fast-growing and highly adaptable. |
| **Sarcandra glabra** (Thunb.) Nakai | Sarcandra | **Whole plant (Zhongjiefeng):** Clears heat, cools blood, boosts blood levels, resolves macula, dispels wind, and frees network vessels. | Grows in ravines or dank area in valleys. |
| **Plumeria rubra** L. cv. Acutifolia | Pagoda Tree | **Flowers or bark (Jidanhua):** Clear heat, disinhibit dampness and remedies summer heat. | Grows in a warm, humid, sunny, well-drained environment. |
| **Platycladus orientalis** (L.) Franco | Chinese Arborvitae | **Mature seed (Baiziren):** Nourishes the heart and calms the spirits, antiperspirant, moistens the intestines, and stool softener. **Shoots and leaves (Cebaiye):** Cools blood, stops bleeding, expectorant, relieves cough, and promotes hair growth and darkening. | Grows on moist, fertile lands and in limestone mountains. |
| **Desmos chinensis** Lour. | Chinese privet | **Leaves (Jiubingye):** Dispels wind, disinhibit dampness, joint relief medicine, relieves pain, fortifies the spleen and stomach, anti-marial, and anti-parasitic. **Roots (Jiayingzhaoge):** Dispels wind, relieves pain, moves qi, transforms stasis, anti-parasitic, and antipruritic. | Grows in hillsides, forest-edge shrubs, or low-altitude wilderness, roadsides, valleys, ditches, and other places. |
| **Clerodendrum bungei** Steud. | Rose Glorybower | **Stem leaves (Choumudan):** Clears toxins, anti-inflammatory, remedies rheumatism, lowers blood pressure. **Roots (Choumudangen):** Promotes qi-flowing, fortify the spleen, dispel wind dampness, antitoxin, dispel swelling, and reduce blood pressure. | Grows on hill slopes at an altitude below 2500 m, forest margins, ravines, roadsides, and dank places in thickets. |
### Woody Species

| Species (Latin Name) | English Name | Major Function(s) | Growth Environment(s) |
|---------------------|--------------|-------------------|-----------------------|
| **Clerodendrum fortunatum L.** | Redcalyx Glorybower | **Stems and leaves (Guidelonglong):** Clears heat, relieves cough, resolve toxins, and dispel swelling. **Roots or root coat (Guidelonglonggen):** Clears heat, detoxification, cool blood, and dispels swelling. | Grows on hill-slopes at an altitude below 1000 m, hills, near villages, and on open fields. |
| **Magnolia biondii Pamp.** | Biond’s Magnolia | **Buds (Xinyi):** Dispers wind, clears nasal passages. | Grows in forests at altitudes 600–2100 m. |
| **Ginkgo biloba L.** | Maidenhair Tree | **Mature seed (Baiguo):** Constrains the lungs and stabilizes panting, reduces vaginal discharge, and reduces frequency of urination. **Leaves (Yinxingye):** Astringe lungs, calm panting, invigorate blood, transform stasis, free channels, relieve pain, resolve turbidity, and lower cholesterol. | Grows in natural forests of acidic soil with good drainage at altitudes 500–1000 m. Can be cultivated. |
| **Ficus carica L.** | Edible Fig | **Fruit (Wuhuaguo):** Clears heat, creates fluids, fortifies the spleen, opens the stomach, resolves toxins, and dispels swelling. **Flowers (Foshouhua):** Circulate fluid in the liver, regulate qi, and remedy upset stomach and belching. **Roots (Foshougangen):** Regulate qi and relieve phlegm. | Grows on warm and sunward hill-slopes. |
| **Citrus medica L. var. sarcodactylis Swingle** | Finger Citron | **Fruit (Foshou):** Circulates fluid in the liver, regulates qi, harmonizes the stomach, relieves pain, desiccant, relieves phlegm. **Flowers (Foshouhua):** Circulate fluid in the liver, regulate qi, and remedy upset stomach and belching. **Roots (Foshougangen):** Regulate qi and relieve phlegm. | Grows in deep, loose, fertile, well-drained, mildew-acidic sandy soil rich in humus. |
| **Cinnamomum cassia Presl** | Cassia Bark Tree | **Trunk and branches’ bark (Rougui):** Supplements fire, assists yang, conducts fire to return to its source, warming agent, relieves pain, warms and frees the channels and vessels. **Branchlet (Guizhi):** Promotes sweating, clears toxins from the flesh, warms and frees the channels and vessels, assists yang in transforming qi, rejuvenates downbeat qi. | Cultivated in sandy soil and slopes in hilly areas. |

### Vine Varieties

| Species (Latin name) | English Names | Main Function | Grow Environment |
|---------------------|--------------|---------------|------------------|
| **Zehneria indica (Lour.) Keraudren** | Indian Zehneria | **Tubular roots or whole plant (Mabaorer):** Clears heat, detoxification, removes swelling, disperses stagnation, relieve phlegm, and induce urination. | Grows in damp places in forests, roadsides, fields, and thickets. |
| Species (Latin Name)               | English Names                      | Main Function                                                                 | Grow Environment                                                                 |
|-----------------------------------|------------------------------------|-------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
| **Vine Varieties**                |                                    |                                                                               |                                                                                  |
| *Zanthoxylum nitidum* (Roxb.) DC. | Shiny-leaved Prickly Ash           | Roots (Liangmianzhen): Move qi, relieve pain, dispel wind, free channels, invigorate blood, resolve stasis, clear toxins, and dispel swelling. | Born in low hills, bushes, roadsides, and other sunny places.                     |
| *Polygonum multiflorum* Thunb.    | Tuber Fleece Flower                | Tuber (Heshouwu): Clears toxins, remedies swollen abscesses, moistens intestines, anti-constipation agent, and anti-malarial agent. | Grows in grasslands, on roadsides, hillsides, rock crevices, and bushes.          |
|                                   |                                    | Processed tuber (Zhiheshouwu): Tonifies the kidneys, supplements blood, hair-darkening agent, strengthens muscles and bones, resolves turbidity, and lowers cholesterol. |                                                                                  |
|                                   |                                    | Cane (Yejiaoteng): Nourishes blood and calms mental state, dispels wind, and frees network vessels. |                                                                                  |
| *Gynoacemma pentaphyllum* (Thunb) Mak | Five-leaf Gynostemma               | Aboveground parts (Jiaogulan): Cooling agent, supplement deficiency, clear toxins. | Grows in thick forests of valleys, thin forests on mountain slopes, thickets, or roadside tussocks at altitudes 300–3200 m. |
| *Lonicera japonica* Thunb.        | Japanese Honeysuckle               | Flower bud, possibly with recently opened flowers (Jinyinhua): Clears heat, resolves toxins, disperses wind-heat. | Grows in thin forests on hill slopes, in thickets, by villages, roadsides.        |
|                                   |                                    | Branches (Rendongteng): Clears heat, resolves toxin, dispel wind, free channels. |                                                                                  |
| *Asparagus cochinchinensis* (Lour.) Merr. | Wild Asparagus                  | Earthnut (Tiandong): Nourishes yin, moistening agent, clears lungs, and engenders fluid. | Grows in dank places of mountains.                                                |
| **Herbal Variety**                |                                    |                                                                               |                                                                                  |
| Species (Latin name)              | English Names                      | Main Function                                                                 | Grow Environment                                                                 |
| *Artemisia indica* Willd.         | Mugwort                            | Leaves (Aiye): Warm channels, stop bleeding, disperse cold, relieve pain, desiccant, and antipruritic. | Grows on wet forest margins, slopes, scrublands, or forest grasslands at low to mid-altitude. |
Table 1. Cont.

| Herbal Variety | Species (Latin Name) | English Names         | Main Function                                                                                                                                  | Grow Environment                                                                 |
|----------------|----------------------|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
|                | Leonurus japonicus Houtt. | Wormwood-like Motherwort | **Fresh or aboveground parts (Yimucao):**  
Invigorate blood, aid menstruation, induce urination, reduce swelling, cooling agent, and detoxicant.  
**Mature fruit (Chongweizi):**  
Invigorate the blood, regulate menstruation, clear the liver, and brighten the eyes.  
**Flowers (Yimucaohua):**  
Nourish blood, invigorate blood, and promote urination. | Grows on ridges, roadsides, streams, or hillside grasslands, mostly in sunny areas, growing up to 3000 m above sea level. |
|                | Houttuynia cordata Thunb. | Fishwort              | **Whole fresh plant or aboveground parts (Yuxingcao):**  
Cooling agent, antitoxin, expel pus, relieve swollen abscess, promote urination, and relieve strangury. | Grows in ditches, streams, or wetlands under the forest.                           |
|                | Crotalaria pallida Ait. | Smooth Crotalaria     | **Whole plant (Zhushidou):**  
Cooling agent, moisturizer, detoxicant, and relieves stasis.  
**Roots (Zhushidougen):**  
Detoxicant, resolve stasis, and eliminate stagnation. | Grows in barren grasslands and sandy soils.                                        |
|                | Platycodon grandiflorum (Jacq.) A. DC. | Balloon flower | **Roots (Jiegeng):**  
Diffuse the lungs, promote the throat, eliminate phlegm, and expel pus. | Grows on mountain grass slopes, forest margins, or cultivated.                    |
|                | Mesona chinensis Benth. | Chinese Jellygrass    | **Aboveground parts (Lianggeencao):**  
Relieves summer-heat syndrome, clears heat, cools blood, and detoxification. | Grows in lime martinis and dry sandy land grass.                                   |
|                | Talinum paniculatum (Jacq.) Gaertn. | Mock Ginseng          | **Roots (Turenshen):**  
Tonifies qi, moistens lungs, relieves cough, and regulates menstruation. | Grows in humid places.                                                           |
|                | Perilla frutescens (L.) Britt. | Common Perilla        | **Leaves (or small soft branches with leaves) (Zisuye):**  
Skin clarifier, disperses cold, moves qi, and harmonizes the stomach.  
**Mature fruit (Zisuzi):**  
Aids downbeat qi, expectorant, relieves cough, calms panting, moistens intestines, and softens stool.  
**Stems (Zisugeng):**  
Moves qi, expands the center, calms fetus, and relieves pain. | Grows in the wasteland or cultivated in gardens.                                  |
|                | Pogonatherum crinitum (Thunb.) Kunth | Goldensilk Grass      | **Whole plant (Jinsicao):**  
Cleans heat, detoxification, cools blood, stops bleeding, and moisturizes. | Grows in riversides, wall crevices, hillsides, and wet fields.                    |
| Herbal Variety | Species (Latin Name) | English Names | Main Function | Grow Environment |
|----------------|---------------------|---------------|---------------|------------------|
| **Zingiber officinale Rosc.** | Ginger | **Dried rhizome or earthnut (Ganjiang):** | Dried rhizome or earthnut (Ganjiang): Warsms torso, restores yang and frees arteries and veins, warms the lungs to clear phlegm. **Prepared dried rhizome or earthnut (Paojiang):** Warsms channels, stops bleeding, warms the body, and relieves pain. **Fresh rhizome (Shengjiang):** Antiperspirant, resolves exterior, warms body cavity, antiemetic, expectorant, relieves cough, removes fish and crab toxins, resolves medicinal toxin-based illness. **Rhizome (Jiangpi):** Circulates bodily fluids and disperses swelling. | Grows on sloping and slightly shady plots. |
| **Nephrolepis auriculata (L.) Trim.** | Tuberous Sword Fern | **Rhizome, leaves, or entire plant** | Rhizome, leaves, or entire plant (Shenjue): Clears heat, induces urination, treats strangury, relieves cough, disperses swelling, and detoxification. | Grows in forests by streams, 30–1500 m above sea level. |
| **Cassia tora L.** | Sickle Senna | **Seeds (Juemingzi):** | Sees (Juemingzi): Clears heat for improving eyesight, moistening the intestines and freeing the stool. | Grows on roadsides, open fields, or hillsides. |
| **Polygonum cuspidatum Sieb. et Zucc.** | Tigen stick | **Roots and rhizomes (Huzhang):** | Roots and rhizomes (Huzhang): Induces urination, treats jaundice, clears heat, resolves toxin, disperse stasis, relieve pain, stops cough, and acts as expectorant. | Grows in valleys, streams, or on shores. |
| **Liriope spicata (Thunb.) Lour.** | Lily Turf | **Tuber (Damaidong):** | Tuber (Damaidong): Yin-nourishing and liquid-engendering properties. | Grows on hillsides, valleys, forests, roadsides, or wetlands at an altitude of 50–1400 m. |
| **Zingiber zerumbet (Linn.) Roscose ex Smith** | Ball Ginger | **Rhizome (Hongqiujiang):** | Rhizome (Hongqiujiang): Promotes blood circulation for dispelling stasis, promotes qi-flowing to suppress pain, warm core and arrests diarrhea, dispenses accumulation, and stimulates muscles. | Grows in moist places under forests. |
| **Oldenlandia diffusa (Willd.) Roxb.** | Spreading Hedyotis | **Entire plant with roots (Baihuasheshcaio):** | Entire plant with roots (Baihuasheshcaio): Cooling agent, detoxicant, and induces urination. | Grown along humid field edges, ditch sides, roadsides, and grasslands. |
| **Coleus amboinicus Lour.** | Cuban Oregano | **Whole plant (Daoshouxiang):** | Whole plant (Daoshouxiang): Cools, anti-inflammatory, used to expel wind, and resolve toxins. | Grows in sunny environments. |
Table 1. Cont.

| Species (Latin Name)          | English Names             | Main Function                                                                                                                                                                                                 | Grow Environment                      |
|-------------------------------|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|
| **Pogostemon cablin** (Blanco) | Patchouli                 | **Aboveground parts (Guanghuoxiang):** Fragrances, eliminates dampness, harmonizes the stomach for stopping vomiting, to prevent heat stroke, and to resolve exterior.                                        | Grows in the hot and humid climate.    |
| **Curcuma phaeocaulis** Val.  | Zingiberaceae             | **Rhizome (Ezhu):** Activates qi-flow, circulates blood to dissipate stasis, and relieves pain. **Earthnut (Yujin):** Circulates blood, relieves pain, activates qi-flow, removes restlessness, and soothes liver and gallbladder. | Grows in the shade.                    |
| **Impatiens balsamina** L.    | Garden Balsam             | Flowers (Fengxianhua): Dispels pathogenic wind and remove dampness, promote blood circulation to suppress pain, used as detoxicant and antiparasitic agent. **Roots (Fengxiangen):** Promotes blood circulation to relieve pain and disinhibit dampness for detumescence. | Grows in a sunny, warm, humid environment and gardens. |
| **Duchesnea indica** (Andr.) Focke | Indian Mock Strawberry   | Whole plant (Shemei): Clears heat-related toxin, dissipates stasis for detumescence, cools blood, and relieves hemorrhages.                                                                                   | Grows on hill-slopes, riverbanks, grassland, or moist places. |
| **Baphicacanthus cusia** (Nees) Bremek. | Flaccid Conehead          | Rhizomes and roots (Nanbanlangen): Clears heat and detoxication; used to cool blood and soothe the throat. **Powder or clumps processed from leaves or stem (Qingdai):** Clears heat and detoxification; used to cool blood, eliminate spots, and relieve excessive heat and relieve paranoia. **Leaves (Nanbanlanye):** Clears heat and detoxification; used to cool blood and relieve hemorrhage. | Grows in damp places.                  |
| **Acorus tatarinowii** Schott | Grass leaf sweet flag rhizome | Rhizome (Shichangpu): Opens orifices, clears phlegm, arouses spirits, sharpens the mind, promotes dampening properties, opens stomach.                                                                        | Grows in wetlands or on rocks by the stream. |
Table 1. Cont.

| Herbal Variety | Species (Latin Name) | English Names | Main Function | Grow Environment |
|----------------|----------------------|---------------|---------------|------------------|
| **Lilium lancifolium** Thunb | Tiger Lily | **Bulb (Baihe):** Nourishes yin and moistens the lungs; clears heart burn to promote calmness. | Grows under shrubs on hillsides, meadows, roadsides, or in water. |
| **Hemerocallis fulva** (L.) L. | Orange | **Roots (Xuancaogen):** Clears heat, induces urination, cools blood, and relieves hemorrhages; resolves toxins; and used to stop swelling. **Tender seedlings (Xuancaonenmiao):** Clears heat, and induces urination. | Grow under shrubs on hillsides, meadows, roadsides, or water. |
| **Mimosa pudica** L. | Sensitive Plant | **Whole plant (Hanxiucao):** Clears heat, and disinhibits urine, calms mental state, and cools blood, and detoxification. **Roots (Hanxiucaogen):** Used to suppress cough and dissipate phlegm, disinhibit dampness to free network vessels, and improve eyesight as well as calm mental state, and harmonize stomach to disperse accumulations. | Grows in bushes in the wild. |
| **Stachytarpheta jamaicensis** (L.) Vahl | Jamaica Vervain | **Whole plant and roots (Yulongbian):** Clears heat, disinhibits dampness, resolves toxins and to dispel swelling. | Grows in the shady and damp grass in the valley at an altitude of 300–580 m. |
| **Rhoeo discolor** (L' Herit.) Hance | Oyster plant | **Flowers (Banglanhua):** Clears the lungs to dissipate phlegm, used to cool blood and relieve hemorrhaging, and detoxification to treat dysentery. **Leaves (Banglanye):** Clears heat, detoxification, resolves stasis, and stops blood loss. | Artificial cultivation in gardens and flowerbeds. |
| **Chrysanthemum morifolium** Ramat. | Common Chrysanthemum | **Capitulum (Juhua):** Dispels pathogenic wind-heat, suppresses hyperactive liver to improve eyesight, removes toxin regarding detumescence. **Young leaves (Juhuamiao):** Used to clear liver and brighten the eyes. **Leaves (Juhuaye):** Used to clear liver and brighten eyes, resolve toxins, and to dispel swelling. | Cultivated; grow in warm, humid climates and sunny locations. |
| **Polygonum chinense** L. | China Knotweed | **Aboveground parts (Huotanmucao):** Clears heat and drains dampness and cools blood, detoxification, used to suppress hyperactive liver to improve eyesight, activate blood, and comfort sinew. | Grows in valleys, by waterside, and wetlands. |
### Table 1. Cont.

| Herbal Variety                  | Main Function                                                                 | Grow Environment                                                                 |
|--------------------------------|------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| **Ruta graveolens L.**          | Whole plant (Choucao): Expels wind, clears heat, disperses swelling, removes | It is a cultivated species; it is cultivated in greenhouses north of the Yangtze River. |
|                                | toxins, activates blood, and disperses stasis.                                |                                                                                   |
| **Saxifraga stolonifera Curt.** | Whole plant (Huercao): Disperses pathogenic wind, clears heat, provides     | Grows in forests, shrubs, meadows, and wet rock crevices at an altitude of 400–4500 m. |
|                                | detoxifying effects, and cools blood.                                         |                                                                                   |
| **Murdannia bracteata (C. B.    | Whole plant (Tanhuocao): Dissipates phlegm and dissipates binds, clears heat  | Grows on lime martinis at altitudes 500–850 m and under the jungle.               |
| Clarke) O. Kuntze ex J. K.      | for relieving strangury.                                                      |                                                                                   |
| Morton**                        |                                                                              |                                                                                   |
| **Zephyranthes candida (Lindl.)**| Whole plant (Ganfengcao): Suppresses hyperactive liver and pathogenic wind.  | Grows in bushes, roadsides, or gardens, and for ornamental use.                     |
| **Aloe barbadensis Miller**     | Dried products concentrated from leaf juice (Luhui): Drain fluids from       | Grows in rock and soil, cultivated.                                               |
|                                | extremities, promotes purgation, and used to clear liver, relieve heat stress, |                                                                                   |
|                                | and destroy parasites to cure malnutrition.                                  |                                                                                   |
| **Centella asiatica (L.) Urb.** | Whole plant (Jixuecao): Clears heat and promotes diuresis, resolves toxins,  | Grows in shady and wet grasslands, fields, and ditches at an altitude of 200–1900 m. |
|                                | and disperses swelling.                                                       |                                                                                   |
| **Phyla nodiflora (L.) Greene** | Whole plant (Penglaicao): Clears heat and used for detoxification.            | Grows in humid places such as hillsides, flat land, river beaches, etc. at an     |
|                                |                                                                              | altitude of 300–2300 m.                                                          |
| **Dendrobium officinale**       | Stems (Shihu): Engenders liquid for nourishing the stomach and clears heat.  | Grows on the trunk of thin forests at an altitude below 1600 m or on semi-dank   |
| Kimura et Migo                  |                                                                              | rocks in a ravine.                                                               |

Examples of these management models include (a) ten secondary schools (Figure 1), (b) aroma garden of L’Occitane at the Technological and Higher Education Institute of Hong Kong (THEi) Tsing Yi campus (Figure 2), and (c) land from the Far East Consortium International Limited in Sai Kung Pak Kong (Figure 3), which were developed for the cultivation and conservation of CMHs and the promotion of a healthy urban environment.
Figure 1. Cont.
Figure 1. Ten secondary schools. (1) Yan Chai Hospital No.2 Secondary School. (2) Diocesan Boys’ School. (3) Tung Wah Group Hospitals Chun Yuk Ma Memorial College. (4) Po Leung Kuk Lo Kit Sing (1983) College. (5) Pope Paul VI College. (6) The Evangelical Lutheran Church of Hong Kong Yuen Long Lutheran Secondary School. (7) Sing Yin Secondary School. (8) Fukien Secondary School (Siu Sai Wan). (9) Fung Kai No.1 Secondary School. (10) Kiangsu Chekiang College.

Figure 2. Aroma garden of L’Occitane at The Technological and Higher Education Institute of Hong Kong (THEi) Tsing Yi campus.
3. Sustainability Issues of a Chinese Herbal Garden in Hong Kong’s Urban City

Currently, the possible sustainability issues consist of [19]:

(1) A lack of environmental afforestation (land resources)
Land resources are an important part of Hong Kong’s sustainable development. Hong Kong requires careful planning to ensure that every inch of land can be fully utilized to meet the development needs of the city.

As the geography of Hong Kong is more mountainous and less flat, land farming only accounts for about 18 square kilometers, mainly concentrated in the northern New Territories. The abandoned and fallow agricultural land accounts for about 70% of the total agricultural land.

(2) Small population for participation (Manpower planning)
Hong Kong’s was dominated by industry in 1970; then, the financial industry was developed. With universal education, it is more difficult to attract young people to employment in agriculture as opposed to other industries. The previous generation retired with no replacement.

(3) Finance (Economy)
Results cannot be achieved through sustainable development in a short period. It requires a long-term plan. Funding operations are needed in all aspects, including operation and management, but Hong Kong lacks support in this regard, e.g., the salary of employees is higher in other jobs.

(4 and 5) A lack of knowledge and cultivation skills (Education and training as well as Cultivation)
Experienced farmers have retired, and there is insufficient information regarding, for example, education or training in terms of cultivation, leading to inadequate skills to improve planting.

Based on the above sustainability issues that have occurred in a Chinese Herbal Garden, a management model must be established.

4. Management Model

The management model (Figure 4) of a Chinese Herbal Garden was developed for secondary schools, including Aroma garden of L’Occitane at the Technological and Higher Education Institute of Hong Kong (THEi) Tsing Yi campus, and a patch of land in Sai Kung Pak Kong, which consisted of five major sustainability areas: (1) Land resources, (2) Manpower planning, (3) Economy, (4) Education or Training, and (5) Ecosystem (Cultivation), which achieved a sustainable system for CMHs. A workflow of the Chinese Herbal Garden involved a relationship between secondary schools, a private company, and the community that enhanced the interest in CMHs for students and the public. There are no
economic issues for the Chinese Herbal Garden because it is self-supported, which is the most important advantage and leads to a win–win situation.

![Management model for a Chinese Herbal Garden](image)

**Figure 4.** Management model for a Chinese Herbal Garden.

This management model also can be implemented in the five elements of the TCM theory including wood, fire, earth, gold, and water (Figure 5). Wood is managing and making efforts (Education or Training); fire is motivation and emotions (Manpower planning); earth is the usage and operation of land (Land resources); gold is the operation and management budget (Economy). Water is an important resource in the ecosystem for cultivation.

![Management model for traditional Chinese medicine theory of a Chinese herbal garden](image)

**Figure 5.** Management model for traditional Chinese medicine theory of a Chinese herbal garden.

### 4.1. Land Resources

Land resources are the most important aspect of sustainable development. Hong Kong has a large population situated in a small area with limited land resources; therefore, the Hong Kong Government is implementing the “Greening Scheme” in Hong Kong’s different districts, namely, Sheung Wan, Central, Wan Chai, Causeway Bay, Hung Hom, Mong Kok, and Kwun Tong, which are introducing “green corridors” to enhance environmental quality with a focus on greening the streets with dense buildings by using potted plants to enhance the green landscape [20].
The Hong Kong Government also recently launched the “Agricultural Land Restoration Project”, which matches farmers with private landowners to try institute abandoned agricultural land restoration. Our patch of land in the Far East Consortium International Limited in Sai Kung Pak Kong is an example of restoration work, as well as the cultivation and conservation of CMHs. The area is being weeded in time for the conservation of some CMHs, such as *Brueca javanica* (L.) Merr. (Figure 6), *Schefflera octophylla* (Lour.) Harms (Figure 7), *Lantana camara* L. (Figure 8), *Tadehagi triquetrum* (L.) Ohashi (Figure 9), *Hedyotis hedyotidea* (DC.) Merr. (Figure 10), *Evodia lepta* (Spreng.) Merr. (Figure 11), and *Sarcandra glabra* (Thunb.) Nakai (Figure 12). However, the development and conservation of the Chinese Herbal Garden still rely on student participation and motivation. The benefits of this eco-farm cannot be fully realized until it is known what teachers and college students think of them and how they plan to use them [21]. How do we continue the sustainable development of the Chinese herbal garden? Basically, self-finance and operation are the central ideas for developing our Chinese Herbal Garden. Since the land resources are limited and labor participation with high-salary employment is difficult to ensure, it is in turn difficult to establish a Chinese Herbal Garden in an urban city. However, the management model in item 4 with five important elements can overcome these problems. We expect to provide a green environment in a concrete jungle, with a specific focus on Hong Kong.

![Figure 6. Brueca javanica (L.) Merr.](image)

![Figure 7. Schefflera octophylla (Lour.) Harms.](image)
Figure 8. *Lantana camara* L.

Figure 9. *Tadehagi triquetrum* (L.) Ohashi.

Figure 10. *Hedyotis hedyotidea* (DC.) Merr.
As the THEi advocated for students’ work-integrated learning before graduation, if the students study and work in the Chinese Herbal Garden through practicing hours, we will have found a good way to save extra money and time. They are time-restricted and are not familiar with Chinese herbal gardens; therefore, training is required, which is another cost. We would like to allow our students to solve this problem.

Human resources are another important issue in which a high salary increment is required for the recruitment of employees, including managers, garden coordinators, gardeners, etc. Although we may recruit part-time volunteers from the social community, they are time-restricted and are not familiar with Chinese herbal gardens; therefore, training is required, which is another cost. We would like to allow our students to solve this problem. As the THEi advocated for students’ work-integrated learning before graduation, if the students study and work in the Chinese Herbal Garden through practicing hours, we will have found a good way to save extra money and time.

The Chinese Herbal Garden fulfills the social responsibility of helping disadvantaged groups. It offers CMHs employment training courses and uses Chinese Herbal Gardens as learning places to train disadvantaged groups who are interested in joining our Chinese Herbal Garden and enhancing their employability.

4.3. Economy

The Chinese herbal gardens are temporarily supported by the Chinese Medicine Development Fund, or Environment and Conservation Fund, but the resources are unstable and will not be provided within several years or earlier. A long-term financial plan and
collaboration with a Nonprofit organization (NPO) for the sustainable development of Chinese Herbal Gardens should be considered.

Meanwhile, the Chinese herbal gardens may impose entry fees if opened to the public on holidays. The students led the participants to travel around Chinese herbal gardens, identifying common herbal plants in Hong Kong, gaining basic knowledge of their medicinal properties, and joining workshops or seminars on the application of CMHs. These activities were required at their own expense to balance the administration and operation costs for Chinese herbal gardens.

In addition, the CMH business line was established for the area in Sai Kung Pak Kong. Many research projects would be conducted in the Chinese Medicine and Culture Research Center of THEi, such as the research and development of Organic Local Heritage Products, e.g., Herbal Tea, Chinese herbal Foot Bath packs, Chinese herbal essential oils, and Chinese herbal skin products, etc., since they are common and usually used in daily life. These research products could be promoted and sold in the market. All of these are made on a small scale first, and then the market result was awaited. If the product is market-recognized and the technology becomes mature, the products could be mass-produced. These will bring considerable income, but this is at the beginning phase. This would build up the brand and allow for collaboration with other businesses. Recently, China’s Belt and Road Initiative (BRI) has provided a great business opportunity, wherein products might be accessed from other markets or countries, leading to a steady income of the Chinese Herb gardens without a pause or interruption. The products are signed as “Hong Kong Production”, starting from CMHs cultivation, quality control (safety issues), and development, which are performed by our institution.

4.4. Education and Training

The Chinese Herbal Garden is an educational or teaching resource, thus it functions as a supplementary information center for secondary schools and tertiary institutions.

4.4.1. Secondary School

Traditional lessons are boring for secondary school students; they just listen and read the information from books. Some concepts are difficult to understand and realize. This is an ineffective form of learning. Knowledge should coexist with theory and either one cannot be excluded. Students may exhibit critical thinking with the help of the Chinese Herbal Garden by using their knowledge to practice theory. The integration of the Chinese Herbal Garden-based strategy (CHGBS) into teaching and learning improved the students’ academic performances and changed their lifelong learning skills and view of nature [22]. The CHGBS also has been shown to be a positive influence on social and emotional learning (SEL) including relationship skills, responsible decision making, self-awareness, social awareness, and self-management [23], since the secondary school students had to work in the Chinese Herbal Garden independently, try to cultivate CMHs by themselves, and were required to make some decisions during the cultivation of the CMHs.

In addition, the CHGBS altered the students’ mental statuses and enabled increased physical activity since the Chinese Herbal Garden-based strategy enables outdoor activities and lessons not limited to classrooms; this is a benefit for the students who cannot accept cramming-style education and who do not excel in classroom activities. Outdoor activities change students’ minds, allowing them to become relaxed and thereby enabling them to achieve their studies with half the effort.

Meanwhile, the Chinese Herbal Garden integrates Chinese medicine into the campus, which might allow teachers and students to attain a better understanding of Chinese medicinal culture and its application in daily life, e.g., in diet and nutrition. CMHs are related to food, i.e., “Homology of Medicine and Food”. Many foods are medicines, and there is no absolute dividing line between them. A Chinese Herbal Garden acts as a sustainable food system [24], either producing herbals or cooking foods with herbals as natural resources. This is an example of students learning from life. The concept is most
similar to STEM education, which is positioned to develop diverse student potentials in order to meet future challenges, especially with respect to enhancing students’ learning abilities and improving their critical thinking skills [25]. The Chinese herbal garden exposed the secondary students and started their training in CMHs earlier.

4.4.2. Tertiary Institution

Apart from the above advantages, the establishment of a Chinese Herbal Garden in a tertiary institution had greater use and effectiveness compared with the secondary school, especially at the Technological and Higher Education Institute of Hong Kong (THEi) Tsing Yi campus. Since THEi developed a Bachelor of Science (Honours) Chinese Medicinal Pharmacy course to admit tertiary students, the Chinese Herbal Garden would play an educational role through its use in the practical section for specific disciplines, such as phytochemistry, macroscopic authentication in Chinese Materia Medica, medical botany, horticulture, and pharmacology [26–29]. This is a 4-year degree program, and with the help of the sustainable development of a Chinese Herbal Garden, most of the students are trained, graduate successfully, and can be employed as regulatory officers of Chinese medicine-related government departments or public organizations, Chinese pharmacy management or executive staff, production or quality control personnel of Chinese and Western medicine factories, Chinese medicine-testing or appraisal personnel, and Proprietary Chinese Medicine Registrars. Thus, the Aroma Garden was established at the Technological and Higher Education Institute of Hong Kong (THEi) Tsing Yi campus.

Aroma Gardens would be linked with education, working relationships, and the public [30] because it is open to the outside world and organizes different interest classes and volunteer activities, which provide a platform for the popularization of CMHs community education.

THEi would hold educational events regularly with the help of the Chinese Herbal Gardens, such as seminars on Chinese Medicinal culture. The content included “Chinese Herbal Medicine for COVID-19 and Chinese Herbal Medicine Cultivation”, “The Evolution of Chinese Medicine Preparations”, etc. Workshops were also organized regarding Chinese Medicine preparations for the students and the public, including the production of comfrey balm, Jie Geng Granules, and Liuwei Dihuang Wan. Furthermore, secondary schools were invited to a community exhibition to share their thoughts on the CMHs project, which exhibited authentic Chinese herbal medicine and educated the public. Where did the financial support or economic funding originate from for these operations? It will suffice to say that the economy was a great challenge for Chinese Herbal Gardens.

4.5. Ecosystem

Cultivation is a part of an ecosystem and a branch of agricultural science that discussed the principles and operations of garden management for CMHs [31]. The WHO and the European Medicines Agency (EMA) promoted and formulated the “Guidelines for Good Agricultural and Collection Practices for Medicinal Plants” (GACP) in 2004 [32]. These regulated the cultivation of CMHs to ensure their safety and reliability, such as environments, humidity, suitability, air, soil, and water standard regulations, to achieve the high quality and controllability of the cultivated and collected CMHs [33].

Fertilization is another important measurement for the ecological planting of CMHs. The unreasonable use of chemical fertilizers and pesticides neglects the output, quality, safety, environmental pollution, and environmental protection of CMHs. Some industries have used a great number of chemical fertilizers and pesticides for the CMHs to shorten their growth period as well as increase economic benefits. Scientific fertilization recently promoted the cultivation of CMHs because it alleviated soil pollution, prevented soil quality deterioration, and enhanced the rate of CMHs’ growth [34].

Meanwhile, the spatial distribution of the soil organic carbon density (SOCD) was the main factor for the CMHs’ planting. It was better to maintain the temperature and humidity of the soil layer. The SOCD gradually decreased when the temperature increased.
This signaled the need for a soil-testing fertilization formula that would guarantee the healthy development of the CMHs’ planting [35]. Furthermore, the TCM residue acts as a better fertilizer than manure for improving soil aggregation stability and crop yields. It enhanced soil aggregation by decreasing Na\(^+\) and K\(^+\) accumulation and increased the soil organic matter (SOM), total nitrogen (TN), and NaOH-N content. These were the major components and nutrients for CMHs growth [36,37].

There is an innovative approach in our Chinese Herbal Garden regarding the planting of the CMHs. As we already know that TCM residue is a good fertilizer, we would like to collect the residue from our Chinese Herbal Garden directly through the withered herbs and the waste after the products’ development according to a specific selection of CMHs and perform a natural-processing procedure to successfully recycle the CMHs. This would also improve soil fertility for the CMHs growth because the residue is natural and organic without any chemical compounds, pesticides, or heavy metals used due to the CMHs’ waste resource utilization (water recycling).

Moreover, the area in Hong Kong is very limited and most of the secondary schools choose vertical planting to suit the environment. Cultivation must occur at different heights, and the varieties to be planted must be carefully selected such that they match the surrounding environment of the planting site.

5. Discussion

What are the advantages of the sustainable development of Chinese Herbal Gardens? It lowers the impact on the environment from chemical fertilizers, pesticides, and soil pollution during the cultivation of the CMHs. Chinese Herbal Gardens are an organic-farming method, which relies upon farm-derived renewable resources, such as Chinese medicine residues, to maintain the biological processes of medicinal plants and the ecological balance of habitats.

The sustainable development of Chinese Herbal Gardens also provides environmental protection or conservation of CMHs, as well as a green culture in Hong Kong’s urban city. It helps to ensure a better life for present and future generations because a Chinese Herbal Garden is a relaxing place that teaches students and the public about CMHs. This will also achieve long-term economic growth since we will design and develop our CMHs’ products so that they can be sold to the market, which balances the costs or even leads to a net gain from the Chinese herbal gardens.

The most important aspect of sustainable development for Chinese Herbal Gardens is its continuous funding or financial plan. How do we link the five major areas including “Land resources”, “Manpower planning”, “Economy”, “Education or Training”, and “Ecosystem (cultivation)”?

Our management model also fulfilled the requirements of the United Nations Convention on Biological Diversity. They mention the implementation of agriculture in line with sustainable development, and the goals include using water, land, nutrients, and other natural resources efficiently; managing biodiversity for the sustainable conservation of biological resources; and reducing the impact of agriculture on the environment so that other ecological services can be maintained, e.g., by reducing the use of chemicals [38].

Compared with the other studies, our proposed management model in a Chinese Herbal Garden is only suitable for Hong Kong’s urban city. The management model is not only focused on the economy—it also accounts for education and training. It solves the understaffing problem, as we have a Bachelor of Science (Honours) Chinese Medicinal Pharmacy course instituted at the Technological and Higher Education Institute of Hong Kong (THEi) Tsing Yi campus. The students are required to learn by action, participate in research work for the development of products, and to try to initiate a business. These are different from other studies that only relate to the economy and cultivation. Hopefully, this management model will also help to train talents for the corresponding industries.
6. Conclusions

The management model of Chinese Herbal Gardens is still being established, but there is no doubt that sustainable development must consist of land resources, manpower planning, economy, education or training, and ecosystem concerns (cultivation). A lack of funding and over-reliance on organizational support is thought to threaten success. Thus, it is better to have long-term operation management and maintenance, as well as financial support for Chinese Herbal Gardens. This management model is expected to achieve benefits for the cultivation and conservation of CMHs, employee training, and the promotion of a healthy urban environment.

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