The 19th International Botanical Congress Memorial Garden "Project 2121" 2020-2021 Report

MCF 红树林基金会

MCF Introduction

As the first non-governmental public fundraising environmental conservation foundation in China, Shenzhen Mangrove Wetlands Conservation Foundation (MCF for short) dedicates itself to protecting wetlands and their biodiversity, as well as conserving nature through public engagement. Currently, MCF is working on its three strategic projects: The Guardian the Shenzhen Bay, Saving the Spoon-billed Sandpiper, and Restoring the Sea Forest.

In July 2012, MCF was founded by the Society of Entrepreneurs and Ecology (SEE), a cohort of nature-loving entrepreneurs and pertaining departments of Shenzhen municipal government. Wang Shi and Ma Weihua served as presidents (founding chairmen), Zhang Bigong, Ai Luming, Sun Lili and Cheng Jinsong served as honorary chairmen, Lei Guangchun served as chairman, and Liu Mingda served as executive chairman.

Park Introduction

The Futian Mangrove Ecological Park covers an area of about 38 hectares. The park is located at the estuary where the Xinzhou River and the Shenzhen River meet. It is adjacent to the Futian Mangrove National Nature Reserve in the west and Shenzhen Bay in the south. It is also adjacent to the Ramsar International Important Wetland Hong Kong Mai Po Nature Reserve, which puts the park at an extremely important ecological position. The administrative supervisor of the park is the Water Affairs Bureau of Futian District, and the MCF undertakes the tasks of management and operation, habitat improvement and popular science education of the park.

The park opened in December 2015 and is free to the public. The park is divided into a north area and a south area. The south area, occupying 14.3 hectares, is an ecological control area. The north area is divided into a visiting area and an ecological restoration area, which is open to the public throughout the year, serving visitors and surrounding communities.

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Introduction

Birth of the Memorial Garden

The International Botanical Congress (IBC) has a history of more than 100 years. It is the world's highest-level and most influential event in plant sciences, and the only international event in the field that achieves interdisciplinary, multidisciplinary, and comprehensive exchanges. The 19th IBC was held in Shenzhen on July 23-29, 2017, after more than 8 years of preparation. It was jointly organized by the Botanical Society of China and the Shenzhen Municipal Government. Hosted in China for the first time, the event was broadly commended by the international botanical community for its "Chinese style" and "Shenzhen characteristics".

- Launch ceremony of the 19th International Botanical Congress Memorial Garden

Human society is facing multiple deepening global crises and must make new choices accordingly. Thus, the 19th International Botanical Congress was held under the context of the increasingly acute contradiction between man and nature. The Shenzhen Declaration on Plant Sciences (hereinafter referred to as the Shenzhen Declaration) was released at the congress. It brings together the collective wisdom of plant scientists around the world and establishes basic methods and pathways for the plant science community to participate in global green and sustainable development. The Shenzhen Declaration is also an important theoretical framework to guide the development of global plant sciences.

To commemorate the historically important event for the international botanical community, and to better implement the plant science development concept formulated in the Shenzhen Declaration, the Shenzhen Municipal Government "approved that the memorial garden of the conference be located in Futian Mangrove Ecological Park and designated the Futian District Government for its funding and implementation". On September 12, 2021, the opening ceremony of the 19th International Botanical Congress Memorial Garden was held in Futian Mangrove Ecological Park. On the same day, a long-term scientific experiment with a century as its timeline — Project 2121 — was launched.

The project, jointly initiated by the Shenzhen National Climate Observatory, the Shenzhen Fairy Lake Botanical Garden of Chinese Academy of Sciences, the Futian District Education Bureau, and the Shenzhen Mangrove Wetlands Conservation Foundation (MCF), is led by the Futian District Government and implemented by the MCF. It will use the Memorial Garden as a plant science platform, bringing together scientists and the public to conduct education, international collaboration, botany research and funding, biodiversity data sharing, and citizen science projects in the coming century. Aiming to become a bridge connecting plant scientists around the world and bring together the concepts, methods and technologies of global green and sustainable development, Project 2121 will help promote green and sustainable development lifestyle in the whole society. It also aims to expand the research field and depth, promote the concept of green development, and provide a reference for the natural restoration of the city. In a time when environmental problems are increasingly serious, the long-term experiment is expected to reveal the relationship between biodiversity and the environment, function as a model of green and sustainable development, and prompt people to care for plants, and care for our future.

Messages from Partners

To commemorate the 19th International Botanic Congress in Shenzhen, the municipal government selected a site in Futian Mangrove Ecological Park for the Memorial Garden, which was constructed by Futian District and guided by the Municipal Bureau of Urban Management and Comprehensive Law Enforcement. The memorial garden adheres to the principle of "no ornamental plant" and "nature's design first", which shows the city's greatest respect for nature. In the future, the Shenzhen-Hong Kong ecological protection cooperation will be continuously strengthened in the garden. The whole process of the construction of the Memorial Garden reflects the principle of joint construction, joint governance and sharing, with enthusiastic participation of many parties. The "2121" Centennial Science Program launched today will be an open scientific program for the public. It will also form professional scientific research results, and allow the public to observe and record plant growth through chronicling, making the garden a platform for plant scientific research and public science education. This is also the best commemoration of the Botanical Congress.

—— Zhu Weihua, Deputy District Mayor of the Futian District People's Government, Shenzhen

Messages from Partners

The Memorial Garden has a profound commemorative and inspiring role. Shenzhen people have foresight, resources, vitality, and charm. May Shenzhen people not only play a pioneering role in everything, but also take the lead in basic fields such as botany, leading the country in climbing the world's peak!

—— Deyuan Hong, Academician of the Chinese Academy of Sciences, Institute of Botany, Chinese Academy of Sciences

Congratulations on the official opening of the 19th International Botanical Congress of Memorial Garden, I wish the Memorial Garden can become a world-class plant science base, and can vigorously promote the close cooperation between botany and the public, and push for plant science to lead the global green and sustainable development.

—— Jun Wen, Research Botanist and Curator of Botany, U.S. National Museum of Natural History

To locate the Memorial Garden in the Futian Mangrove Ecological Park shows the government's trust in the Mangrove Conservation Foundation. It is an honor for the MCF to undertake a century-long scientific experiment. The "2121 Plan" was launched this year, and it needs to be taken seriously, managed with persistence and continuity, with bit-by-bit records and day-to-day accumulation, with the participation of the public, student teams, scientific research teams and professionals who are concerned about environmental issues and willing to share data. They are brought together by the scientific concept of the "Shenzhen Declaration", by the characteristics of charity, and by the spirit of professionalism. I believe that, after a hundred years, this mission will still persist. Facing today's increasingly serious environmental problems, I hope that the relationship between environmental problems and biodiversity will be continuously revealed in the long-term experiment, and at the same time, more people will care for plants, and care for our future.

—— Wang Shi, Co-Chairman of the Mangrove Conservation Foundation

The International Botanic Congress in Shenzhen was a wonderful success. The Shenzhen Declaration has proved such a powerful tool for increasing the effectiveness of our efforts to conserve and understand the plants around the world. In the same way, this memorial botanic garden representing the congress will carry forward for the people of Shenzhen a wonderful assemblage and display of the ornamental plants of China, richest source of ornamental plants in the world. It will stand as memorial to the congress now three years ago. It will help the people of Shenzhen to improve their plantings and their understanding of plants and indeed their understanding of the environment. It's a marvelous accomplishment. I'm delighted to see that it is being dedicated now a testimony of the efforts of many and a sign of hope for the future in taking care of the environment and appreciating the wonderful plants of China.

—— Peter H. Raven, Honorary Chairman of the 19th International Botanical Congress, Botanist of Missouri Botanical Garden, USA

The establishment of the 19th International Botanical Congress Memorial Garden is an innovation in the history of the IBC. It reminds us of this very successful International Botanical Congress with Chinese characteristics and Shenzhen style, but also reminds us not to forget the call from this Congress: care for plants, and care for our future.

—— Ge Song, Researcher at the Institute of Botany, Chinese Academy of Sciences

The 19th International Botanical Congress was held in Shenzhen, leaving a permanent memory of Shenzhen in the history of international botany development. The Shenzhen Declaration issued at the Congress had a huge impact. Congratulations on the establishment of the 19th International Botanical Congress Memorial Garden.

—— Huang Hongwen, Director of Lushan Botanical Garden Research Institute, Chinese Academy of Sciences

I attended the International Botanical Congress in Shenzhen in 2017 with great enthusiasm and helped draft the Shenzhen Declaration on Plant Science. I am very happy to see the establishment of Memorial Garden in Shenzhen. The Declaration's seven key calls are more relevant than when they were formulated three years ago.

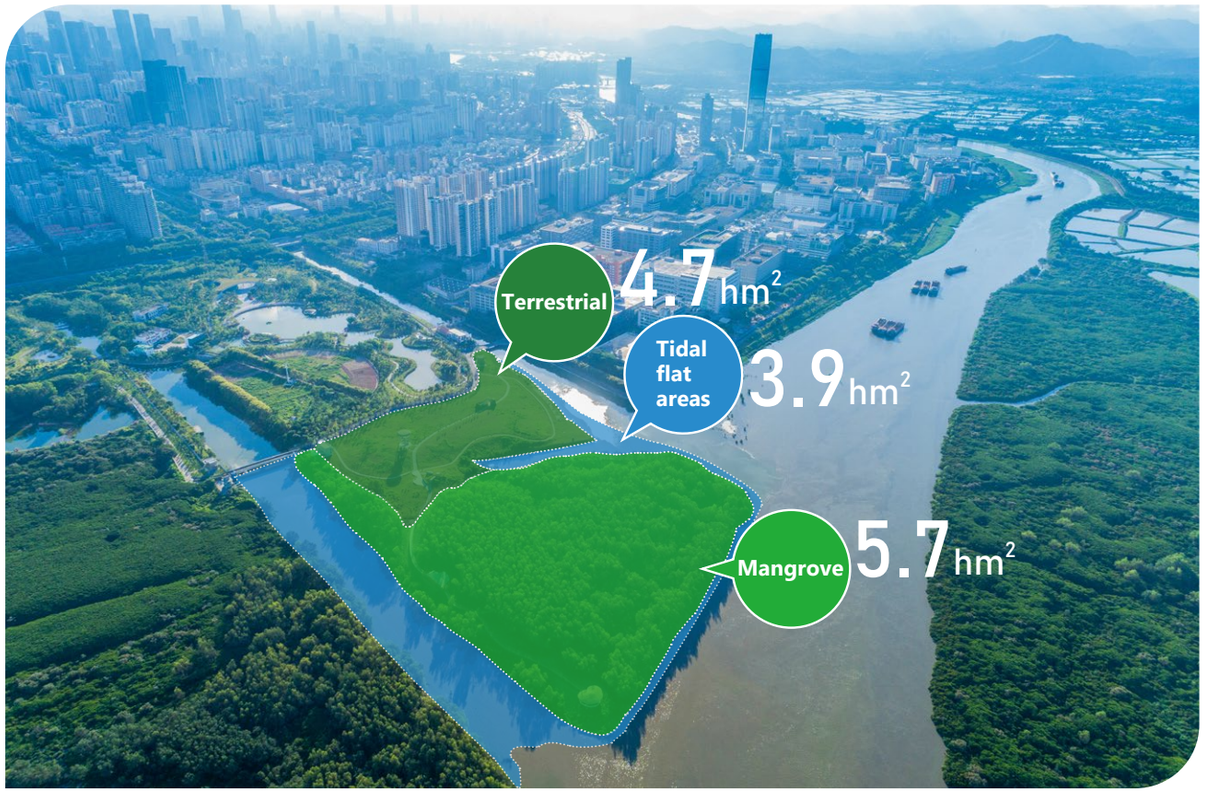
—— John Kress, Senior Research Botanist and Curator of Botany, U.S. National Museum of Natural History

Location of the Memorial Garden

The Memorial Garden is located between 22°30'25-22°30'38 N and 114°1'50-114°2'8 E, on the south side of Futian Mangrove Ecological Park, with an area of about 14.3 hectares. The garden is located at the confluence of the Xinzhou River and the Shenzhen River, and is adjacent to the Guangdong Neilingding Futian National Nature Reserve, the Mai Po Inner Deep Bay Ramsar Site, and the urban area of Shenzhen. It is a transitional zone connecting the urban artificial habitat and the natural habitat.

The garden is divided into mangrove, terrestrial, and tidal flat areas. Among them, the mangrove area is about 5.7 hectares, and the terrestrial area is about 4.7 hectares. The tidal flat area is about 3.9 hectares and is an important feeding ground and habitat for water birds.

- The Memorial Garden and the Shenzhen River



Bio-systems Composition in the Memorial Garden

Natural Environment in the Memorial Garden

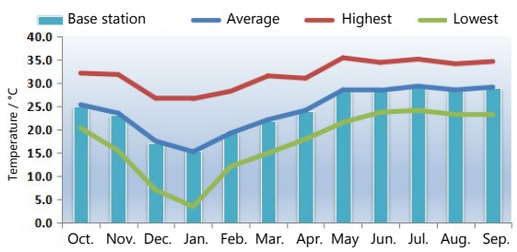
From September 2020 to October 2021, the MCF cooperated with various institutions, universities, and individuals to conduct comprehensive monitoring of the natural environment and organism in the Memorial Garden.

Climate

The climate condition of the Memorial Garden in the past year was analyzed using the monitoring data of Mangrove South Station from October 2020 to September 2021. The analysis shows that the temperature is slightly high, the rainfall is heavy, the humidity is moderate, and the wind speed is low.*

* Memorial Garden meteorological data source: Shenzhen Meteorological Bureau.

Twelve-month meteorological trend

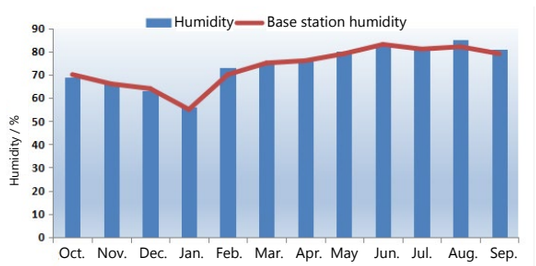


Monthly temperature changes from October 2020 to September 2021 in the Memorial Garden

(Unit: degree Celsius)

Monthly rainfall changes from October 2020 to September 2021 in the Memorial Garden

(Unit: mm)



Monthly relative humidity from October 2020 to September 2021 in the Memorial Garden

(Unit: %)

Climate

(1) The temperature is slightly high. The annual average temperature is 24.2°C, which is slightly higher than the Shenzhen National Base Meteorological Station (hereinafter referred to as the base station) by 0.1°C in the same period (24.1°C); the highest temperature is 35.4°C, which appeared on May 23, 2021; the lowest temperature is 3.4°C, which appeared on January 13, 2021.

(2) There is a lot of rainfall. The annual rainfall is 1,489.7 mm, which is 15.9% more than the city's average rainfall (1,285.6 mm) in the same period; the annual number of rainfall days is 108; the maximum daily rainfall is 115.9 mm, which appeared on August 6, 2021.

(3) Moderate humidity. The annual average relative humidity is 74%, which is 1 percentage point higher than the relative humidity (73%) measured at the base station in the same period.

(4) The wind speed is low. The annual average wind speed is 1.7 m/s, which is 0.3 m/s lower than the wind speed (2.0 m/s) measured at the base station in the same period. Wind direction in the year is mostly east-northeast (ENE frequency 15.7%), and the second most frequent wind direction is northeast (NE frequency 11.1%).

Terrestrial Soil

It is mostly sandy loam, with a large sand content and good permeability, but there is still room for improvement in its ability to retain water and fertilizer; the soil is rich with pores, loose and moist, and its pH is neutral and relatively stable.

The soil texture of a small part of the area is loam, which has good ventilation and water permeability, as well as water and fertilizer retention, and is conducive to plant growth; however, the soil nitrogen and phosphorus content is low, which means it is poor in nutrients.

Some soils contain high levels of chromium (Cr, pronounced "gè" in Chinese), which may pose a risk of contamination.

Sedimentary Environment

Most of the sediments belong to silty loam and loam, and the monitoring sites in the mangrove area retained a lot of organic matter through the interception of mangrove roots.

The heavy metals in the sediments do not exceed the standard and belong to the first and second marine sediment types; however, the environmental characteristics of mangrove sediments are still conducive to intercepting and accumulating heavy metals, and the combined action of mangrove root exudates and soil microorganisms will affect the distribution and valence of heavy metals.

Water Environment

The overall water environment of the Memorial Garden exceeds the Class IV seawater standard. The dissolved oxygen content of the overall water quality is high, and it tends to decrease with the seasonal temperature increase.

The pH of water mostly fluctuates between 7.3 and 8.5, which is relatively stable; the salinity shows an increasing trend with the change of the seasons, which is related to the changes in wet and dry seasons.

The water pollution level in spring and winter is lower than that in summer and autumn; the oxidation capacity and self-purification capacity of water body are better in spring, but weaker in summer, autumn and winter; the content of total phosphorus in spring and winter is lower than that in summer and autumn, and the content of phosphorus in water body is ostensibly higher in summer; the total nitrogen content is high in spring, summer and winter.

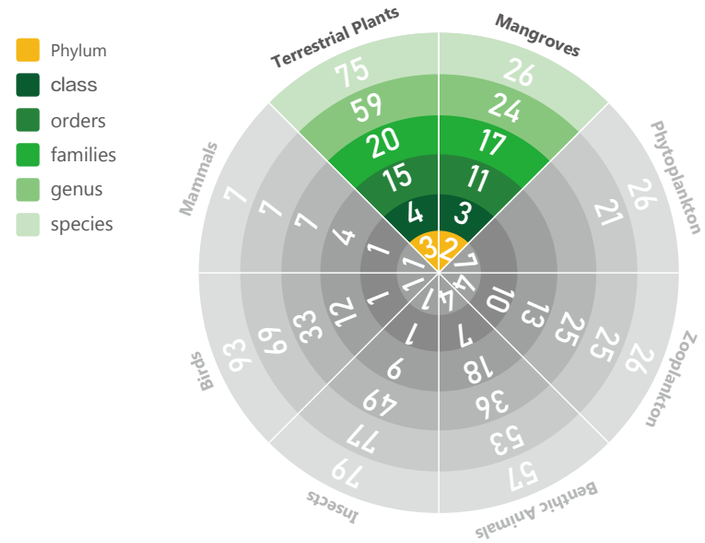
Biodiversity of the Memorial Garden

Terrestrial Plants

There are a total of 75 species of plants in the terrestrial area of the Memorial Garden, belonging to 20 families and 59 genera. Among them, 5 species are included in the list of invasive alien species in China, accounting for 6.7% of the total species.

The plant community has more vegetation in the herbaceous layer and less vegetation in the arbor layer, and the vegetation coverage is more than 90%. Invasive species are the dominant species, mainly *Mimosa bimucronata* and *Bidens pilosa*.

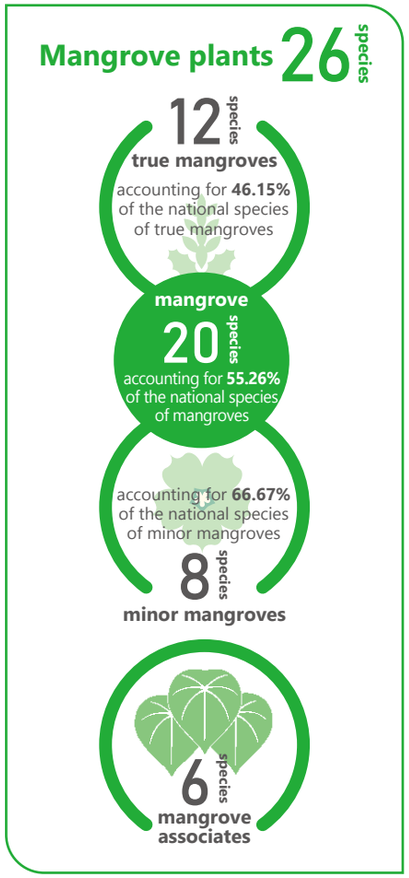
Among them, *Fabaceae* and *Poaceae* occupy the majority, with 18 and 15 species, respectively. The main genera of *Fabaceae* are *Mimosa* and *Acacia*, of which *Mimosa bimucronata* occupies the majority and is an invasive species; in *Poaceae*, *Neyraudia reynaudiana*, *Panicum bisulcatum*, and *Imperata cylindrica* account for the vast majority.

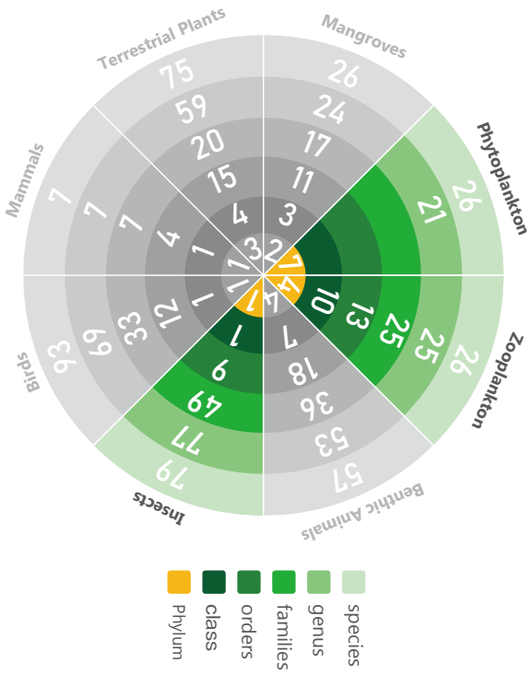


Mangrove Plants

There are 26 species of mangrove plants in the garden, including true mangroves, minor mangroves, and mangrove associates. Among them, there are 20 species of mangrove, accounting for 55.26% of the national mangrove species, and 6 species of mangrove associates. Among the mangroves, 12 species are true mangroves, accounting for 46.15% of the national species of true mangroves, and 8 species are minor mangroves, accounting for 66.67% of the national species of minor mangroves.

In the original plot, there is a large area of alien *Sonneratia apetala* community. After renovation and restoration, the native mangrove community has been restored, and it has become a site for the collection, conservation, and display of mangrove plants.

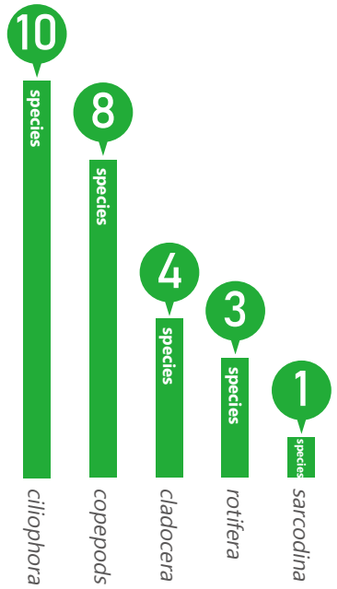




Planktonic Algae

Planktonic algae are often used as indicator organisms to observe the nutritional status of water bodies. A total of 26 species of planktonic algae from 7 phyla have been recorded in the Memorial Garden. The number of algal genera in each phylum is 13 species of *bacillariophyta*, 7 species of *chlorophyta*, 2 species of *cyanophyta,* 1 species of *euglenophyta*, 1 species of *cryptophyta*, 1 species of *dinophyta*, and 1 species of *chrysophyta*.

Among the planktonic algae, *bacillariophyta* dominate, with *navicula*, *nitzschia*, cyclotella and other species in the majority. *Cyclotella* and *nitzschia* can cause algal blooms or red tides and are potential threats.



Zooplankton

Zooplankton is an important animal group in the mangrove ecosystem and is also one of the main foods for economic aquatic animals (especially top and middle-dwelling fish and juveniles). It is an important part of the food chain of the mangrove ecosystem.

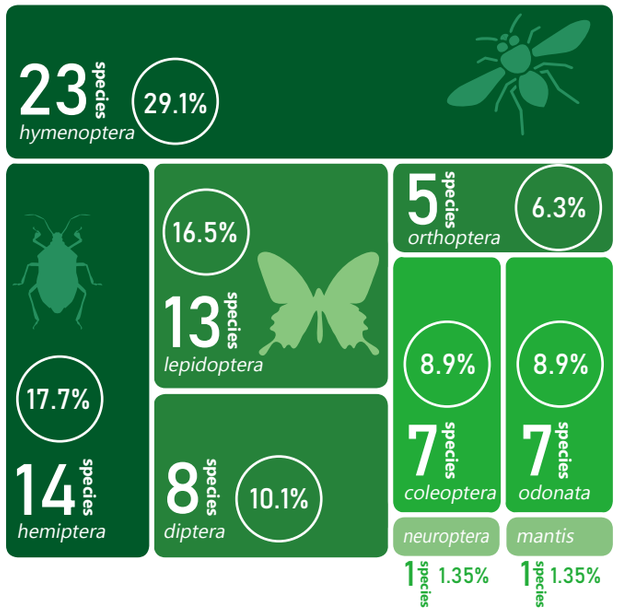
A total of 26 species of zooplankton in 5 categories were identified in the Memorial Garden, including 10 species of *ciliophora*, 8 species of *copepods*, 4 species of *cladocera*, 3 species of *rotifera* and 1 species of *sarcodina*. In addition, there are five types of planktonic larvae, including *polychaeta*, *veliger* larvae, and *copepodid* larvae. Most of these protozoa are brackish water species, and most of them are ubiquitous species, widely distributed in offshore seawater bodies in China and around the world, such as *Didinium nasutum* and *Mosodinium rubrum*.

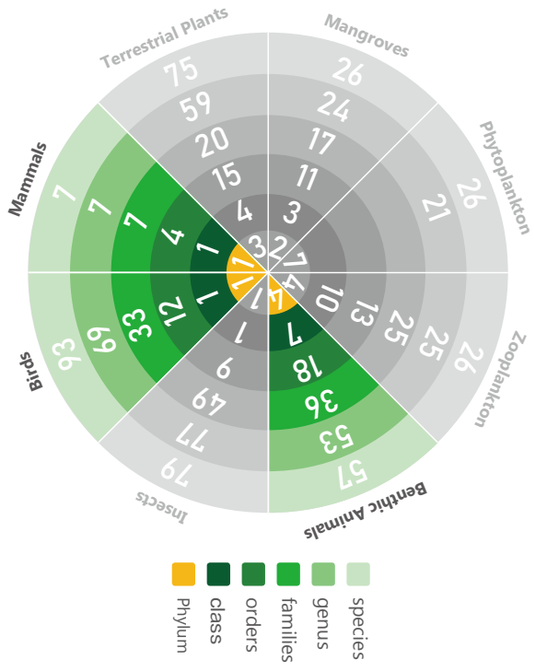
Insects

The Memorial Garden is mainly composed of herbal honey plants such as *Bidens pilosa* and *Sesbania cannabina*, attracting many *hymenoptera*, flower-seeking bees, predatory bees, etc. However, due to the open terrain and strong wind, butterflies rarely stay and gather.

From 2020 to 2021, a total of 79 species of insects in 9 orders, 49 families, including 13 new records and 12 undetermined species (genus) were recorded.

The species and quantity of *hymenoptera* are obviously more than those of other orders. 23 species of *hymenoptera*, accounting for 29.1%. 14 species of *hemiptera*, accounting for 17.7%. 13 species of *lepidoptera*, accountingfor 16.5%. 8 species of *diptera*, accounting for 10.1%. 7 species of *coleoptera*, accounting for 8.9%. 7 species of *odonata*, accounting for 8.9%. 5 species of *orthoptera*, accounting for 6.3%. 1 species of *neuroptera* and 1 species of *mantis*, each accounting for 1.35%.





Birds

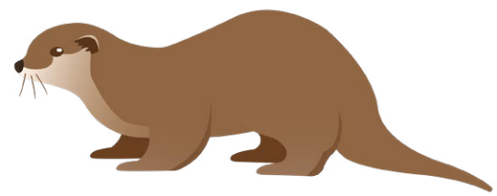
The bare beaches and mangrove wetlands of the Memorial Garden provide wintering and transit stops for water birds in the East Asia-Australasian Flyway. A total of 93 species of birds in 12 orders and 33 families have been recorded in the garden. Among them, there is 1 national first-class protected animal, which is *Platalea minor*; 3 national second-class protected animals: Buteo japonicus, *Milvus migrans* and *Circus spilonotus*.

After the removal of the *Sonneratia apetala* forest was completed in 2019, the habitat in the original area changed greatly. The bird survey after the renovation found that a large number of herons often stop in the mangrove area at the high tide level after the cleaning of the *Sonneratia apetala*, and there are also small groups of Anatidae inhabiting and foraging here. The number of *Bubulcus ibis* has increased significantly. There are small groups of *Bubulcus ibis* that breed in the mangroves on the south side of the Shenzhen River and often visit the Memorial Garden. In addition to water birds, large groups of *Spodiopsar sericeus*, *Acridotheres cristatellus*, and *Gracupica nigricollis*, etc. were also observed in the garden before heading to their nocturnal habitat.

Mammals

Mammals occupy a prominent position in ecosystems and play a key role in maintaining ecological balance and protecting biodiversity.

From January 2021 to September 2021, the Memorial Garden recorded a total of 7 species of mammals, belonging to 4 orders and 7 families, which are the national first-class protected animal *Viverricula indica* and the national second-class protected animal *Prionailurus brngalensis* and *Lutra lutra*, as well as *Sus scrofa*, *Cynopteru sbrachyotis*, *Pipistrellus abramus*, and *Rattus norvegicus*.



Benthic Animals

Benthos is an important part of the biological community of wetland ecosystems, and they are indicator organisms that reflect water quality. Most benthic animals are natural food for fish and birds and play a key role in the material cycle and energy flow of wetlands. A total of 57 species of benthic animals have been recorded in the Memorial Garden, with the largest number of mollusks (21 species), followed by arthropods (18 species), 12 species of annelids and 6 species of fish. There are also *tabanidae l*arvae.

Most of the benthic species are typical species of mangroves living in brackish water, such as *Ellobium aurismidae*, *Sesarmidae*, Ucinae and *Polychaeta*.

2020-2021 Work Result

Ecological Monitoring

Plant Monitoring

During the construction of the Memorial Garden, new vegetation succession began with the unknown plant provenance brought in by foreign soil. To understand and record the natural succession process and plant phenology information, 8 fixed observation quadrats were arranged according to the grid method, and the infrared camera network transmission technology was used to take pictures of vegetation changes in the quadrats at a fixed angle and at a fixed time. These pictures were transmitted through the network and remotely stored and processed, reducing labor costs for onsite staff.

At the same time, the MCF regularly invited professional scientific research teams to investigate and analyze the plants in the plot.

- Plant monitoring infrared camera sites

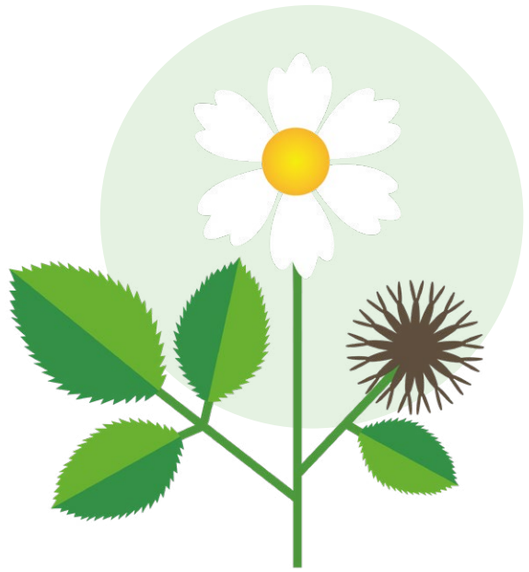
A year-long infrared camera monitoring and follow-up field investigation in the eight quadrats (2m*2m) revealed that:

1. *Bidens pilosa Mimosa bimucronata*, *Mimosa diplotricha*, *Mimosa pudica*, *Solanum torvum*, *Sphagneticola trilobata*, *Tephrosia purpurea*, *Puccinellia tenuiflora*, *Passiflora foetida*, *Macaranga tanarius*, *Broussonetia papyrifera*, *Alysicarpus vaginalis*, *Desmodium tortuosum*, *Leucaena leucocephala*, *Podocarpus macrophyllus*, *Lantana camara*, *Mikania micrantha*, and *Tadehagi triquetrum* became the dominant species of the quadrats.

2. From June to October 2021, these types of plants can be observed for four consecutive months, and the frequency of occurrence is much higher than that of other types of plants, and most of them are invasive alien species. Therefore, it can be concluded that invasive alien species have become the dominant species.

3. Compared with other camera quadrats where dominant species are alien species, the dominant species of camera No. 5 is the native species *Alysicarpus vaginalis*, with a coverage of 80%.

In the future, we can study the natural growth of native species and the competition and extinction mechanism of invasive alien species through continuous monitoring and comparison of vegetation and soil in the quadrats.



Plant Monitoring

Native Plants

Hedyotis auricularia
Trema tomentosa
Phyllanthus urinaria
Panicum bisulcatum
Alysicarpus vaginalis
?
Phragmites australis
Arundo donax
Neyraudia reynaudiana
Cyperus odoratus
Cyperus difformis
Zoysia japonica
Imperata cylindrica

Non-invasive Alien Plants

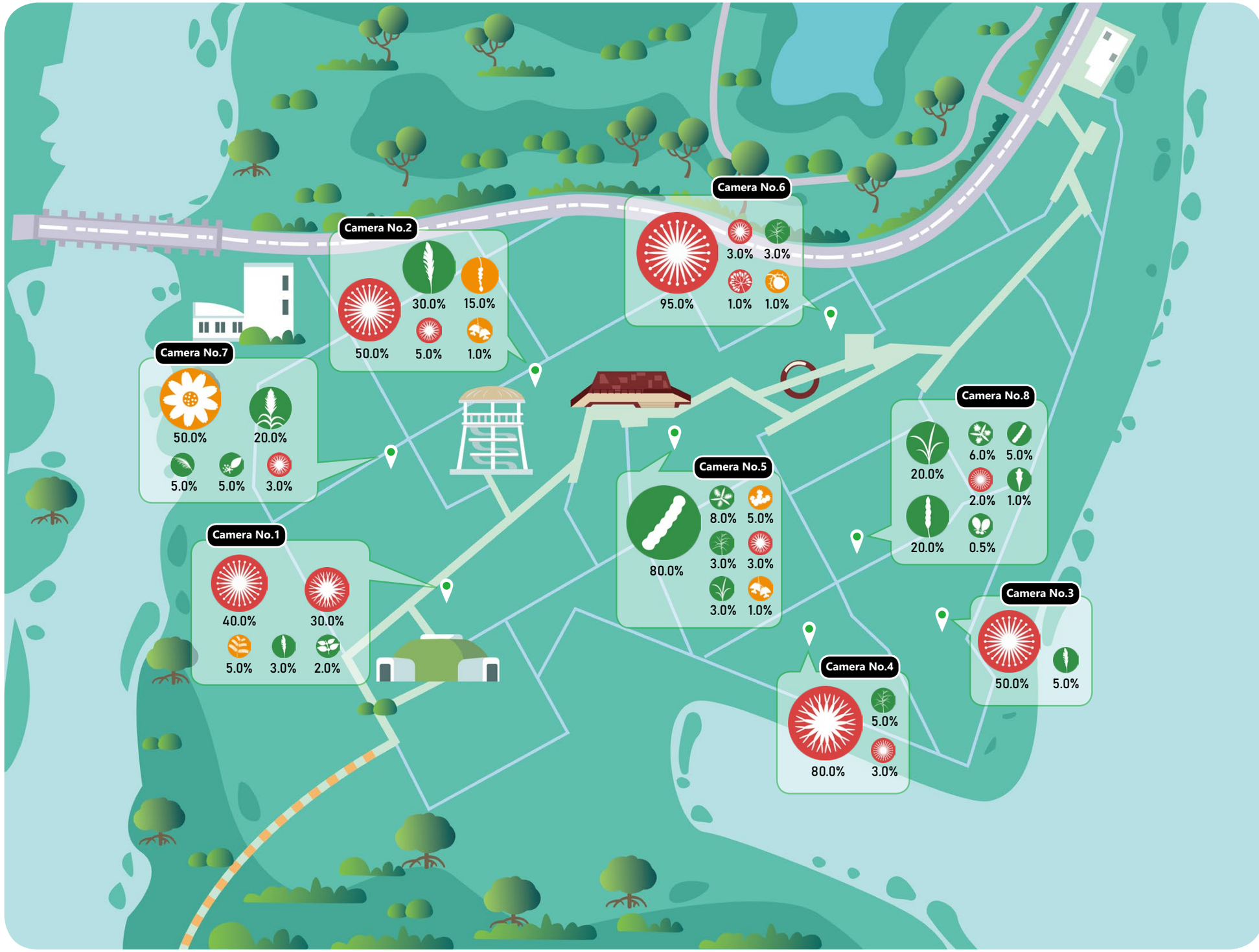
Leucaena leucocephala
Desmodium tortuosum
Sesbania cannabina
Mimosa pudica
Passiflora foetida
Sphagneticola trilobata

Invasive Alien Plants*

Mimosa bimucronata
Bidens pilosa
Mikania micrantha

Percentage means coverage

* Reference: List of Invasive Species in China's Ecological System



Citizen Science

Based on the citizen science action strategy stated in the Shenzhen Declaration, the MCF consciously incorporates citizen science into its monitoring and habitat management work.

Since 2020, the MCF has cooperated with KPMG China to conduct the "Citizen Scientist Project on Plant Monitoring" in the Memorial Garden. In the past year, a total of 16 KPMG China volunteers participated in plant monitoring, which provided valuable data for staff to further analyze plant growth cycle, plant community succession and alien plant invasion.

In combination with field investigations, the MCF uses the photos and videos collected and organized by volunteers in plant monitoring activities, employs coding to extract vegetation data in the photos, and conducts further plant phenology and succession analysis based on natural factors such as temperature and rainfall.

Testimonials from volunteers

The Citizen Scientist Project on Plant Monitoring allows me to participate in wetland protection activities online. With the help of the staff of the MCF, I learned to identify common invasive alien species such as Ipomoea cairica who has a domineering growth pattern. This species is also very commonly mistaken as "morning glory" (Ipomoea nil).

As the project progresses, we gradually learned about the long-term and persistent harm caused by invasive alien species to ecological security. In the second year of the plant monitoring project, we hope to use the phenological data we record to protect this habitat for wintering migratory bird and achieve "Living wetlands, sustainable future".

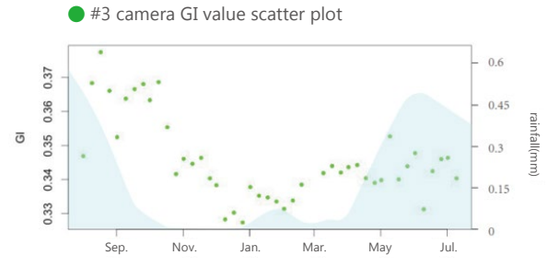
—— KPMG China
Plant Monitoring Citizen cientist, Zhao Yuhan

- Plant monitoring volunteer tasks:

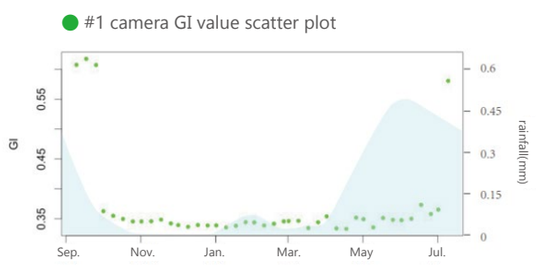
1. monitor camera condition
2. select photos and create videos
3. make observation notes
4. data analysis
5. write monitoring report
6. optimize plant management

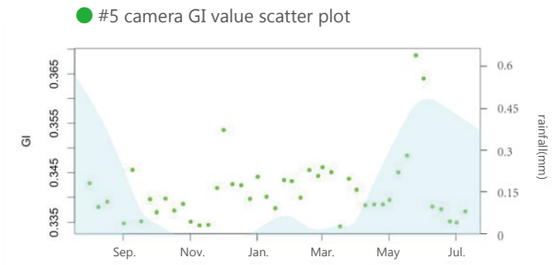
With field data and rainfall data, we use the photos and videos collected by volunteers in our plant monitoring projects to extract GI values* through R language for further plant phenology and succession analysis. (This analysis uses photos taken periodically by 8 fixed-point infrared cameras from August 2020 to July 2021, and we select a total of 48 photos from each camera in one year.)

We discovered through analysis that most monitoring sites basically show that the vegetation growth is positively correlated with the rainfall. During the period of abundant rainfall (April-October), the plant growth is relatively vigorous; in the period of less rainfall (November-March), plant growth is relatively sluggish.



The analysis results of some monitoring sites show that rainfall has no significant effect on vegetation growth, which may be affected by plant species, topography, soil quality and human activities, which would require continuous observation and recording.





* GI value: It can indicate plant growth. The higher the GI value, the "greener" the picture, which means more plant growth in the vegetation area.

Animal Monitoring

The Memorial Garden recorded the *Viverricula indica*, a national first-class protected animal, and the national second-class protected animals *Lutra lutra* and *Prionailurus bengalensis*. As the apex predators in the mangrove wetland ecosystem, their appearance indicates the integrity of the wetland ecosystem.

To understand the status of biodiversity in the Memorial Garden, the MCF has conducted infrared camera mammal monitoring activities.

A total of 10 volunteers participated in the "animal monitoring" work, undertaking regular inspections of infrared cameras, inputting data, etc. Their work was a great contribution to the discovery of animal activities in the Memorial Garden.

- The garden has recorded images of stable movements of *Lutra lutra* since October 2020, which is the first time this species has been recorded in Shenzhen Bay (Shenzhen side) in the past 20 years.
- A total of 403 *Prionailurus bengalensis* images were recorded in the garden this year, which constituted 149 activities. The daily activity rhythm showed that the night was the main activity period, but they were more active during morning and evening time. The activity frequency of *Prionailurus bengalensis* varied in different seasons, and April was the peak period of activity.

-MCF volunteers checking infrared cameras

-Daily activity frequencies of Prionailurus bengalensis

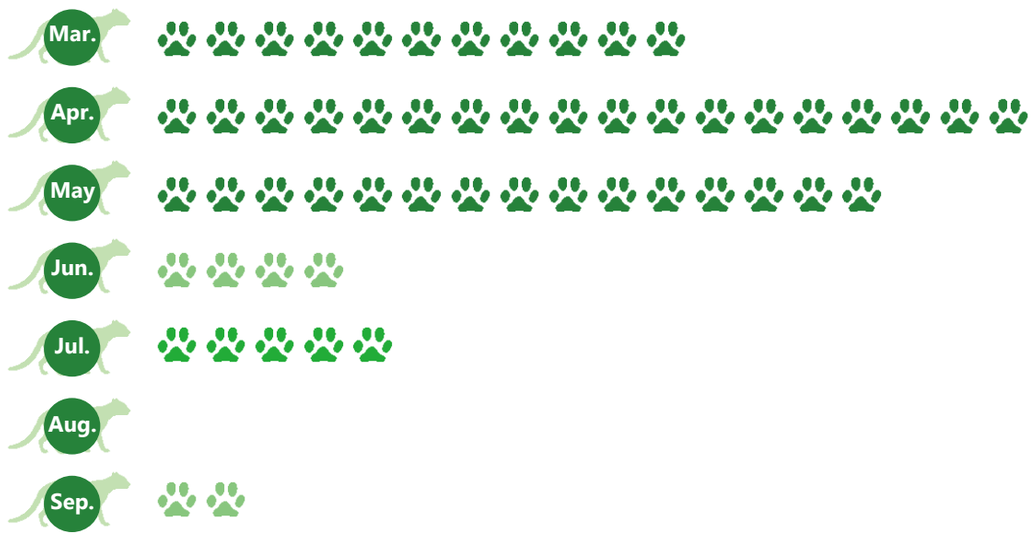
Testimonials from volunteers

I am incredibly grateful to the animal monitoring project of the Memorial Garden. It gave me the opportunity to participate in actual conservation work. By changing batteries, placing cameras, and cleaning weeds in the garden, I felt the difficulty of volunteer work. Sifting through repeated unusable monitoring photos, I felt excited when finally finding the cute animals caught by the camera. I hope that I will be able to participate in similar activities in the future, and I hope that more people will participate in such activities and experience the magic.

—— KPMG China
Animal Monitoring Citizen Scientist,
Huang Xinyue

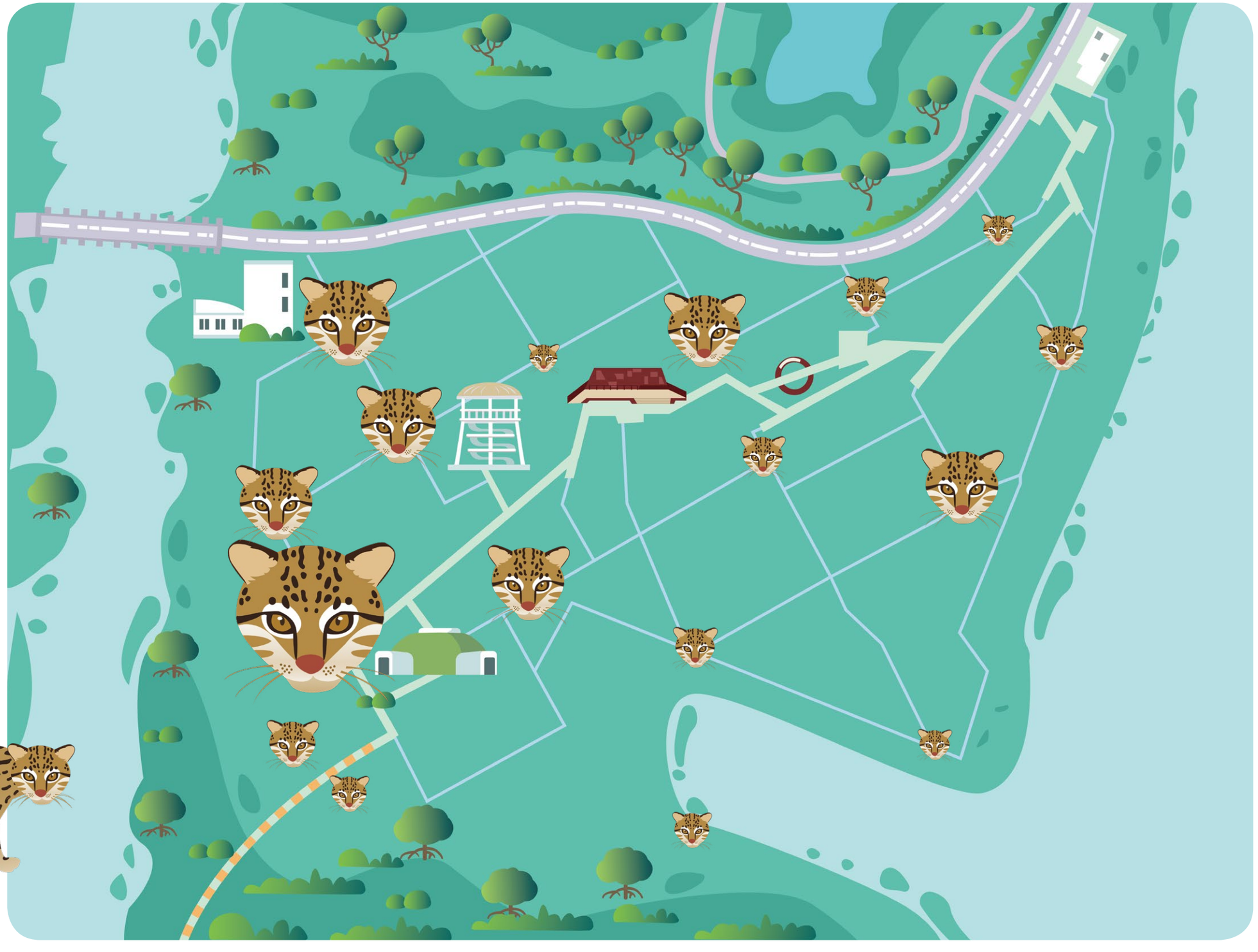
-Mammal monitoring infrared camera plot

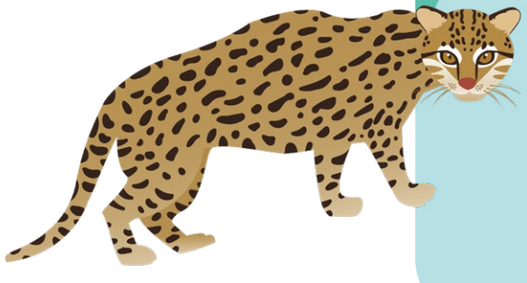
-Activity frequencies of Prionailurus bengalensis from March to September



Animal Monitoring

Camera site	The activity frequency of *Prionailurus bengalensis*
①	2
②	5
③	10
④	1
⑤	21
⑥	14
⑦	11
⑧	37
⑨	8
⑩	4
⑪	10
⑫	5
⑬	5
⑮	3
⑯	9
⑰	6
⑱	4





Habitat Management

Terrestrial Alien Species Plant Removal

The habitat management of the Memorial Garden follows the concept of taking nature as the designer and reducing human intervention. The current habitat management work of the garden, basing on the above concept, intervenes only when the natural order is affected by invasive species, and ensures that the plant succession in the garden conforms to the natural succession order.

In 2021 (as of September), a total of 2,068 kg of alien plant species were removed, including shrubs such as Sesbania cannabina, Desmodium tortuosum, and Leucaena leucocephala. Among them, Leucaena leucocephala and Desmodium tortuosum are widely distributed in the garden.

Compared with 2020, the species and number of native plants increased in 2021, and the abundant rainfall brought enough water for the growth of native plants. At present, the most abundant native arbor in the garden are Macaranga tanarius, Broussonetia papyrifera, Solanum torvum, and Trema tomentosa. For native arbor that grew naturally, the surrounding alien plants were properly removed to reduce their impact on native plant growth.

- Native Arbor: ❶ *Trema tomentosa*, ❷ *Melia azedarach*, ❸ *Solanum torvum*, ❹ *Macaranga tanarius*

Monitoring and Management of *Sonneratia apetala*

During the construction of the Memorial Garden, the *Sonneratia apetala* was completely removed, and local mangrove species such as *Bruguiera gymnorhiza*, *Kandelia obovate*, and *Aegiceras corniculatum* were replanted. After the *Sonneratia apetala* was removed, the original *Kandelia obovate* group got more sunlight and living space, and its growth gradually improved; *Acanthus ilicifolius* grew rapidly; *Bruguiera gymnorhiza*, *Aegiceras corniculatum,* and *Acrostichum aureum* grew well.

From October to November 2020, a quadrat survey of *Sonneratia apetala* was carried out in the management area. The number of *Sonneratia apetala* seedlings was greatly reduced, and the spread was controlled. But the proportion of tillering seedlings increased, which requires continuous attention. In 2021, 5.2 hectares of mangrove forests were cleared of seedlings and tillering seedlings of *Sonneratia apetala*.

-*Sonneratia apetala* appearing in August 2020

-*Sonneratia apetala* growing lavishly in October 2020

-*Sonneratia apetala* removed in November 2021

Bird Habitat Management

The Memorial Garden is an ecologically controlled area and is less disturbed by human activities. It is an ideal area for creating a habitat for birds (especially water birds). At the estuary of the Xinzhou River and the northeast bank of mangrove forests, a total of 1,000m^2 of grass-proof cloth was laid to control the growth of vegetation in the area; a 20cm-thick gravel layer was also laid in this area to create high-quality bird habitat conditions.

Public Participation

Nature Education Activities

From 2020 to 2021, the MCF designed a sectoral experimental nature education activity "Fighting Green Monsters" targeting diverse types of widely distributed invasive plants in the Memorial Garden. Corporate employees, community residents, and primary and secondary school students participated in these activities. Public awareness of the original habitat and its ecological value enhanced as people participated in scientific investigations and invasive species control. They gained knowledge about native species and are more aware and respectful of the law of nature in general. These activities also allow participants to experience citizen science level experiment and hone their skills, and experience conservation in the field.

1 Feature **Different alien species**
–*Bidens pilosa*、*Leucaena leucocephala*、*Tephrosia purpurea*、*Mimosa diplotricha*

2 Feature **Different control mechanisms**
-Hand-pulling, fruit-cutting, or flower cutting

-MCF staff and volunteers collecting data at the quadrants

-MCF staff teaching visitors about alien species

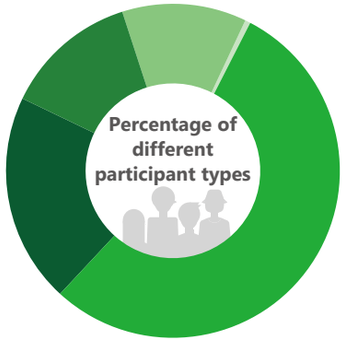
-Alien species removal

a total of 58 "Fighting Green Monsters" activities were carried out

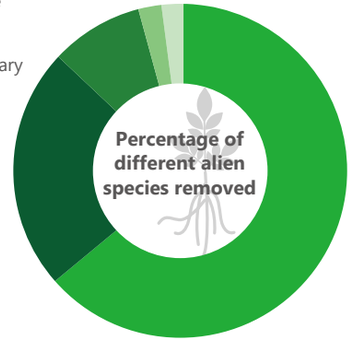
Main removal method: hand-pulling

1469 people participated in the clean-up of alien plants

3260.5 kg of alien plants were removed



- corporate employee **54%**
- primary and secondary school students **20%**
- members of social organizations **13%**
- the general public who signed up **12%**
- MCF volunteers **1%**



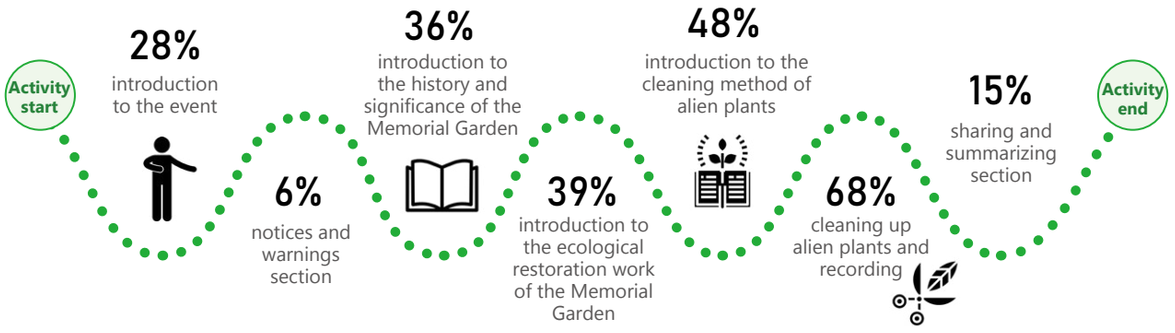
- *Bidens pilosa* **64%**
- *Tephrosia purpurea* **23%**
- *Mimosa diplotricha* **9%**
- *Leucaena leucocephala* **2%**
- *Desmodium tortuosum* **2%**

The MCF gave questionnaires to the citizen science project participants. Based on the results of 159 valid questionnaires, the participants gained knowledge of alien plants, learned how to clean invasive alien plants, and improved their awareness of biodiversity and ecological restoration work.

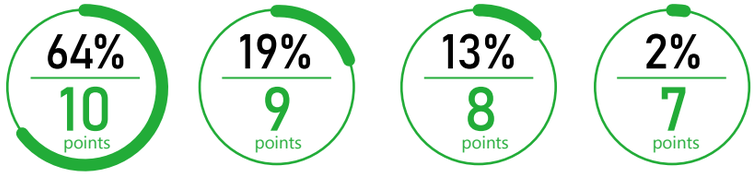
Participant feedbacks of their learning results

The participants also recognized the practicality of the activities and the professionalism of the instructors:

Percentage of participants that liked certain section of the activity



Participant ratings of the professionalism of instructors

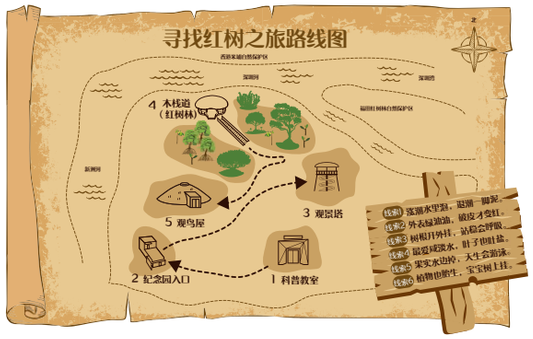


Wetland Course

The MCF, in line with the curriculum standards for primary and secondary schools, iterated annual versions of the wetland education course "In Search of Mangroves". The MCF also cooperated with the Futian District Education Bureau to lead primary and secondary school students to tour the mangrove wetland in the Memorial Garden. The garden, located in the urban center, became a pivotal venue for Futian primary and secondary school students to learn about Shenzhen's local mangrove wetlands, as well as its native animals and plants, through immersive activities.

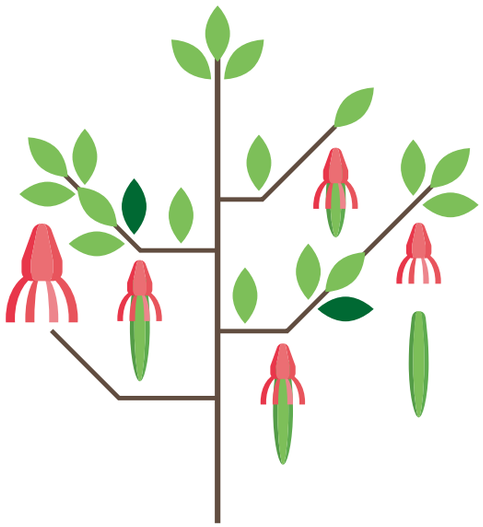
In the past year, a total of 25 classes from 15 schools have taken the wetland education courses in the garden, covering a total of 1,190 teachers and students.

-Task card for wetland courses



-Students participating in the "In Search of Mangroves" course

Messages from Partners



Shenzhen Meteorological Bureau

The 19th International Botanical Congress Memorial Garden is an ecological development model for Shenzhen to build the Pilot Demonstration Area of Socialism with Chinese Characteristics. In just one year since the opening of the garden, it has fully implemented the plant science concept determined by the "Shenzhen Declaration", gathered the wisdom of all parties, and made important contributions in raising people's awareness of plants, strengthening biodiversity conservation, and promoting green development. The garden represents the city's greatest respect for nature.

Plant growth is closely related to climatic conditions. Meteorological work plays a basic scientific and technological support role in the overall layout of ecological civilization construction. Shenzhen Meteorological Bureau has built a meteorological observation station in the Mangrove Ecological Park and has carried out continuous weather and climate monitoring and evaluation to provide scientific data support for plant growth research. The Bureau will continue to support the Memorial Garden in the future and participate in its various scientific projects. I sincerely hope that the International Botanical Congress Memorial Garden will become better and better, that more citizens will feel the charm of nature and plants at close range and practice the concept of green development with practical actions.

Wang Yanqing,
Director of Shenzhen Meteorological Bureau

Futian District Educational Sciences Research Institute

China's first hosting of the International Botanical Congress perfectly demonstrated the "Chinese style" and "Shenzhen characteristics", and the "Shenzhen Declaration" of plant science brought together the collective wisdom of global plant scientists to lay out the basic methods and approaches for plant science to participate in building a green and sustainable development path for the global society. Human society is facing multiple global crises. The earth is the only home for human beings. The momentum of sustainable development is vital for the future of mankind.

As a model district, Futian's education takes "cultivating top-notch innovative talents with international competitiveness" as its mission. Futian District depicts the "education concentric circles" of scientific and technological innovation education. The regional ecological chain of scientific and technological innovation education consists of government investment, school implementation, academia leadership, enterprise participation, and competition assistance. This enables Futian science and technology innovation education to obtain the nuclear scale "super energy", laying a solid foundation for Futian District's scientific and technological innovation education leadership in the city, the province and even the whole country.

This mangrove wetland in Futian is a treasure of the city and a place for primary and secondary school students to learn about Shenzhen's culture, history, and ecology. Since the opening of the Memorial Garden, the Futian District Educational Science Research Institute, and the MCF have innovatively launched a mangrove popular science education project for primary and middle school students in Futian District, allowing students to tour the mangrove wetlands under the leadership of MCF's instructors. They moved from their classroom to nature, combined their textbook knowledge with actual environment. In the past year, a total of 1,190 teachers and students from 25 classes in 15 primary schools in Futian District took the "In Search of Mangroves" course in the Memorial Garden. We propose that: "Let every student in Futian know that there is a mangrove wetland in Futian!" We expect that every student in Futian will be able to tour the mangrove wetland in the future and feel the diversity of nature in the process of experiencing it.

Protecting our shared earth is a common cause of all mankind and the right way to promote the building of a community with a shared future for mankind. Climate change is nature's wake-up call to mankind. We advocate and encourage green recovery, green production, and green consumption, promote the formation of a civilized and healthy lifestyle, and make a good ecological environment an inexhaustible source of sustainable development. We look forward to seeing the International Botanical Congress Memorial Garden becoming the best place to awaken people's sense of harmonious coexistence between man and nature.

Chen Wei
Futian District Educational Sciences Research Institute, Shenzhen

Shenzhen Fairy Lake Botanical Garden of Chinese Academy of Sciences

Shenzhen Fairy Lake Botanical Garden of Chinese Academy of Sciences played an important role in Shenzhen's bid for and preparation and hosting of the 19th International Botanical Congress. Staff from the Fairy Lake Botanical Garden used their wisdom and sweat to make every effort to successfully hold this top international plant science event in Shenzhen. I am greatly honored to be deeply involved in the organization of this conference from beginning to end.

The establishment of the International Botanical Congress Memorial Garden is not only a commemoration of this great historical event, but also makes the garden serve as a plant science base for Shenzhen to implement the Shenzhen Declaration of the congress. The staff of the Fairy Lake Botanical Garden and the Memorial Garden jointly discussed and proposed a centennial scientific plan for the Memorial Garden, and assisted in inviting Academician Hong Deyuan, Honorary President of the International Botanical Congress, Professor Peter H. Raven, Honorary President of the Congress, Prof. Wen Jun, Vice President of the Congress, Prof. Ge Song, Secretary General of the Congress, Prof. Huang Hongwen, Deputy Secretary General of the Congress, and W. John Kress, an internationally renowned plant taxonomist, to attend the opening ceremony of the Memorial Garden.

In just one year since the garden opened, the staff have carried out biodiversity surveys in the garden area and obtained valuable foundational scientific data. At the same time, innovative forms of public scientific exploration and attempts have accumulated experience for public participation and a deep understanding of biodiversity conservation.

At present, the Fairy Lake Botanical Garden has established the Guangdong Shenzhen Urban Forest Ecosystem National Positioning Observation and Research Station Auxiliary Station in the Memorial Garden. In the future, it will continue to deeply participate in the development of various scientific projects in the Memorial Garden. I sincerely hope that the International Botanical Congress Memorial Garden will continue to play a greater role in urban ecological restoration research and the development of citizen science worldwide.

Dr. Jin Hong,
Scientific Secretary of the Preparatory Office of the 19th International Botanical Congress in Shenzhen
Director of the Promotion and Liaison Department of the Preparatory Office of the 19th International Botanical Congress in Shenzhen
Director of the Shenzhen Fairy Lake Botanical Garden Seed Conservation Center

Mangrove Wetlands Conservation Foundation (MCF)

In the past year, I have had the opportunity to come to the Memorial Garden almost every month, and together with the MCF staff, I have introduced the origin of the garden and Project 2121 to people from all walks of life and felt the withering and flourishing of the grass and trees, the changing seasons of insects, and the silhouette of migratory birds flying around in the garden.

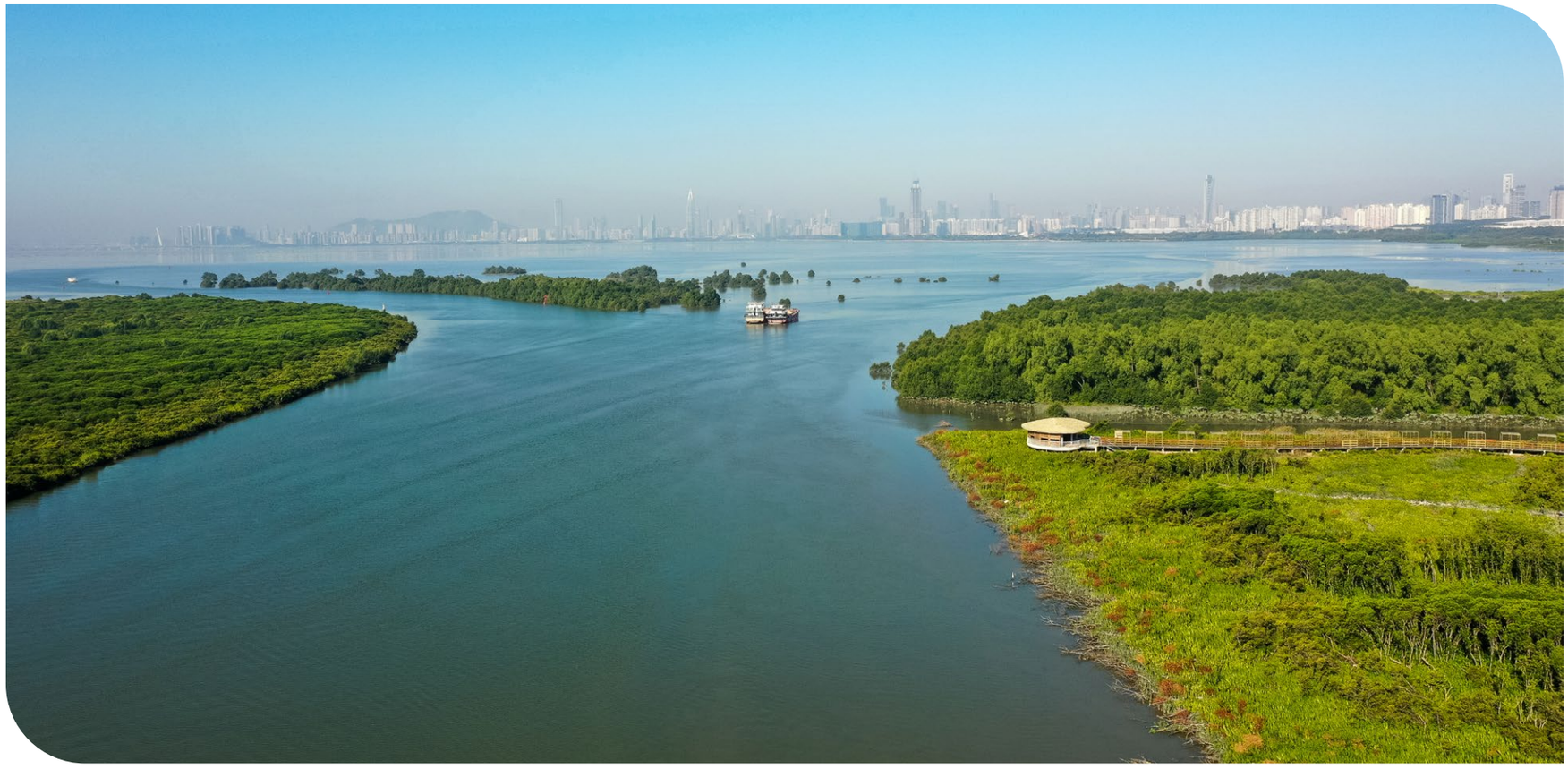
According to the design of the centennial monitoring plan, in the past year, the MCF has carried out the observation and monitoring of plants, meteorology, phenology and birds in the garden. Although this is only the first step in the centennial project, we also saw more possibilities and long-term significance of Project 2121. We watched the changes in the garden, from only soil from various parks in Shenzhen to now lush grass and vegetation. We also found that most of these plants that grow naturally with minimal human intervention are alien species. This pushes us to think about what makes it easier for alien plants to take root here. When alien species dominate the population, we are surprised to find that native plants also grow sporadically but tenaciously, which further stimulates our interest in exploring various factors that affect the growth of native species.

At the same time, the MCF fully mobilized all resources to let the public learn and participate in the activities of the garden through various forms. We carry out guided tours and citizen science activities in the Memorial Garden almost every week, allowing the public to participate in the ecological monitoring and ecological management work in the garden, so that everyone can have a more intuitive understanding of the Memorial Garden and establish more substantial connections. The "Fighting Green Monsters" course designed by the MCF allows everyone to have a better understanding of alien plants and native plants while getting close to nature; the monitoring and clean-up activities of the Sonneratia apetala allow participants to get close to the mangrove ecosystem and gain an in-depth understanding of mangrove.

In the future, we will welcome more professionals and the public (especially primary and secondary school students) to participate in Project 2121, and on the platform jointly built by the MCF and various partners, we will continue to reveal the relationship between biodiversity and the environment. At the same time, it will propel more people to care about plants and focus on the future!

Sun Lili
Director of Futian Mangrove Ecological Park
Founder and Honorary Chairman of the MCF

Outlook



2020-2021 was the starting year of the 19th International Botanical Congress Memorial Garden. In the past year, the MCF has conducted a lot of ecological monitoring, habitat management, and nature education activities in the garden. The MCF diligently followed the concept of the "Shenzhen Declaration" of the IBC, and made unremitting exploration in plant sciences, and accumulated valuable experience.

To further implement the "2121 Plan", the MCF plans to focus on "social participation in revealing the succession pattern of urban natural wilderness and finding ways to manage invasive plants" in the next five years. The MCF also aims to improve continuously on scientific research and citizen science, and at the same time, establish a brand name for the Memorial Garden and increase its popularity.

In terms of scientific research, we plan to build the Memorial Garden into a platform for domestic and foreign plant science researchers and research teams. And we intend to comprehensively consider the local biological conditions of Shenzhen Bay and the status of research and policy on biodiversity at home and abroad, selecting meaningful species and environmental factors to conduct special research and long-term monitoring. At the same time, combine the habitat management work and research to monitor and evaluate management process and phase results, and form evidence-based habitat management mechanisms.

In terms of citizen science, we will make full use of the rich research resources of the Memorial Garden, allow various public access to monitoring data collection and habitat management, and let groups or individuals with professional knowledge participate in data collation, analysis, and reporting. This will raise the public's awareness of the Memorial Garden and the recognition of the centennial monitoring and habitat management work. People will learn more about biodiversity and subsequently become more involved.

In terms of promotion, the Memorial Garden will establish its brand based on its unique historical and social significance and profound background. For example, the MCF will regularly publish monitoring results and periodic reports, habitat management work and citizen science projects, etc. using website and WeChat official account. This will also keep the information of the Memorial Garden open. By regularly publishing work reports, papers and participating in professional seminars, the garden will maintain and enhance the attention and support of partners at all levels, and will attract more scientific research teams, experts and peers to contribute.

2022 is the continuation and improvement of the exploration in 2021. While implementing various tasks, the MCF will strive to innovate, steadily accumulate, and build the Memorial Garden into an exemplary platform for urban plant scientific research, citizen science, and wilderness exploration.

Acknowledgements/ Supporters List

Many thanks to the following partner units, organizations, and individuals for their support of the 19th International Botanical Congress Memorial Garden:

Partner Units

Shenzhen Municipal Bureau of Planning and Natural Resources

Shenzhen Municipal Bureau of Urban Management and Comprehensive Law Enforcement

Shenzhen Meteorological Bureau (Station)

Futian District Water Affairs Bureau

Futian District Education Bureau/Futian District Educational Sciences Research Institute

Futian Subdistrict Office, Futian District

Shenzhen Fairy Lake Botanical Garden of Chinese Academy of Sciences

The Third Detachment of the Guangdong Provincial Corps of the Chinese People's Armed Police Force

Peking University Shenzhen Graduate School

Shenzhen University

Meili Primary School, Futian District, Shenzhen

Enterprise Funders

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KPMG China

ByteDance Public Welfare

Enterprise Supporters

Beijing Turen Landscape Planning and Design Institute

Wall Street English Corporate Training Center

Shenzhen Beilinyuan Landscape and Architectural Planning and Design Institute Co., Ltd.

Shenzhen Guoyi Garden Construction Co., Ltd.

Shenzhen Tiehan Ecological Environment Co., Ltd.

Shenzhen Vanke Urban Construction Management Co., Ltd.

Shenzhen Yisen Ecological Technology Co., Ltd.

Shenzhen Landscape Co., Ltd.

Vanke Southern Business Group

Vanke Enterprise Co., Ltd.

Industrial and Commercial Bank of China Shenzhen Branch

Experts (alphabetic order)

John Kress

Peter H. Raven

Ge Song

Hong Deyuan

Huang Hongwen

Jiao Genlin

Jin Hong

Wen Jun

Ye Limin

Volunteers (alphabetic order)

Cai Chenyan
Chen Haixia
Chen Lian
Chen Wei
Chen Ying
Dai Li
Feng Liyun
Gao Chunmei
Guo Shujuan
He Weitong
Huang Min
Huang Yannan
Huang Zhongmin
Jin Ying
Jin Zhaowei
Lai Siliang
Lei Lei
Li Jiacong
Li Mingkun
Li Yanrong
Li Yishen
Lin Jingyi
Liu Hong
Liu Naijia
Luo Qiang
Ma Xiao
Mo Ningning
Ouyang Yuying
Peng Fuqiang
Peng Junhan
Peng Yonggang
Qiu Yao
Tang Dan
Tang Huihui
Tu Jienan
Wang Chaoyang
Wang Lijian
Wang Jie
Wang Ying
Wang Yuanmin
Wen Jing
Wu Chaoyan
Wu Jing
Xia Qing
Xie Xiaodong
Xiong Wei
Xu Lin
Xu Lingfang
Xu Yutao
Yan Fuxi
Yang Xiaobai
Yu Lan
Zhang Simu
Zhang Weichang
Zhang Yun
Zhao Ling
Zhao Yang
Zhao Yuhan
Zhou Rong
Zhou Rui
Zhu Qilan
Zeng Aiqiong
Zeng Huidong
Zeng Sixue
Zou Hongyan
Zou Lixia
Zou Majun

Appendixes

Species List of the Memorial Garden

Terrestrial Plants

No.	Family	Chinese Name	Latin Name	National Alien Invasive Species List
1	禾本科 Poaceae	白茅	*Imperata cylindrica*	
2		地毯草	*Axonopus compressus*	
3		狗牙根	*Cynodon dactylon*	
4		画眉草	*Eragrostis pilosa*	
5		星星草	*Puccinellia tenuiflora*	
6		结缕草	*Zoysia japonica*	
7		类芦	*Neyraudia reynaudiana*	
8		芦苇	*Phragmites australis*	
9		芦竹	*Arundo donax*	
10		五节芒	*Miscanthus floridulus*	
11		两耳草	*Paspalum conjugatum*	
12		圆果雀稗	*Paspalum scrobiculatum var. orbiculare*	
13		糠稷	*Panicum bisulcatum*	
14		糖蜜草	*Melinis minutiflora*	
15		红毛草	*Melinis repens*	
16	莎草科 Cyperaceae	异型莎草	*Cyperus difformis*	
17		碎米莎草	*Cyperus iria*	
18		断节莎	*Cyperus odoratus*	
19	西番莲科 Passifloraceae	龙珠果	*Passiflora foetida*	
20	大戟科 Euphorbiaceae	飞扬草	*Euphorbia hirta*	
21		通奶草	*Euphorbia hypericifolia*	
22		血桐	*Macaranga tanarius*	
23		叶下珠	*Phyllanthus urinaria*	
24	马鞭草科 Verbenaceae	马缨丹	*Lantana camara*	Second List
25	茄科 Solanaceae	水茄	*Solanum torvum*	
26	旋花科 Convolvulaceae	五爪金龙	*Ipomoea cairica*	
27		三裂叶薯	*Ipomoea triloba*	
28		野地菟丝子	*Cuscuta campestris*	
29		菟丝子	*Cuscuta chinensis*	
30		篱栏网	*Merremia hederacea*	
31	锦葵科 Malvaceae	地桃花	*Urena lobata*	
32		拔毒散	*Sida szechuensis*	
33		美丽异木棉	*Ceiba speciosa*	
34	菊科 Asteraceae	鬼针草	*Bidens pilosa*	Third List
35		微甘菊	*Mikania micrantha*	First List
36		鳢肠	*Eclipta prostrata*	
37		南美蟛蜞菊	*Sphagneticola trilobata*	
38		鹅不食草	*Epaltes australis*	
39	菊科 Asteraceae	夜香牛	*Vernonia cinerea*	
40		羽芒菊	*Tridax procumbens*	
41	茜草科 Rubiaceae	耳草	*Hedyotis auricularia*	
42		鸡矢藤	*Paederia foetida*	
43		阔叶丰花草	*Spermacoce alata*	
44		光叶丰花草	*Spermacoce remota*	
45	豆科 Fabaceae	三裂叶野葛	*Pueraria phaseoloides*	
46		光荚含羞草	*Mimosa bimucronata*	Fourth List
47		巴西含羞草	*Mimosa diplotricha*	
48		含羞草	*Mimosa pudica*	
49		葫芦茶	*Tadehagi triquetrum*	
50		海南黄檀	*Dalbergia hainanensis*	
51		灰毛豆	*Tephrosia purpurea*	
52		翅荚决明	*Senna alata*	
53		链荚豆	*Alysicarpus vaginalis*	
54		南洋楹	*Falcataria moluccana*	
55		假地豆	*Desmodium heterocarpon*	
56		南美山蚂蝗	*Desmodium tortuosum*	
57		田菁	*Sesbania cannabina*	
58		大叶相思	*Acacia auriculiformis*	
59		台湾相思	*Acacia confusa*	
60		马占相思	*Acacia mangium*	
61		银合欢	*Leucaena leucocephala*	
62		猪屎豆	*Crotalaria pallida*	
63	虎耳草科 Saxifragaceae	槭叶草	*Mukdenia rossii*	
64	桃金娘科 Myrtaceae	乌墨	*Syzygium cumini*	
65		蒲桃	*Syzygium jambos*	
66		洋蒲桃	*Syzygium samarangense*	
67	桑科 Moraceae	构树	*Broussonetia papyrifera*	
68		垂叶榕	*Ficus benjamina*	
69		绿黄葛树	*Ficus virens*	
70	榆科 Ulmaceae	山黄麻	*Trema tomentosa*	
71	楝科 Meliaceae	楝	*Melia azedarach*	
72	远志科 Polygalaceae	小扁豆	*Polygala tatarinowii*	
73	苋科 Amaranthaceae	喜旱莲子草	*Alternanthera philoxeroides*	First List
74	罗汉松科 Podocarpaceae	罗汉松	*Podocarpus macrophyllus*	
75	海金沙科 Lygodiaceae	海金沙	*Lygodium japonicum*	

Mangroves

No.	Family	Chinese Name	Latin Name	Notes
1	棕榈科 Palmae	水椰	*Nypa fructicans*	True Mangroves
2	报春花科 Primulaceae	蜡烛果	*Aegiceras corniculatum*	True Mangroves
3	车前科 Plantaginaceat	假马齿苋	*Bacopa monnieri*	
4	大戟科 Euphorbiaceae	海漆	*Excoecaria agallocha*	True Mangroves
5	唇形科 Labiatae	苦郎树	*Clerodendrum inerme*	Minor Mangroves
6	爵床科 Acanthaceae	老鼠簕	*Acanthus ilicifolius*	True Mangroves
7		白骨壤	*Avicennia marina*	True Mangroves
8	旋花科 Convolvulaceae	厚藤	*Ipomoea pes-caprae*	
9	紫葳科 Bignoniaceae	海滨猫尾木	*Dolichandrone spathacea*	Minor Mangroves
10	锦葵科 Malvaceae	银叶树	*Heritiera littoralis*	Minor Mangroves
11		黄槿	*Hibiscus tiliaceus*	Minor Mangroves
12		杨叶肖槿	*Thespesia populnea*	Minor Mangroves
13	草海桐科 Goodeniaceae	草海桐	*Scaevola taccada*	
14	菊科 Compositae	阔苞菊	*Pluchea indica*	Minor Mangroves
15		光梗阔苞菊	*Pluchea pteropoda*	
16	夹竹桃科 Apocynaceae	海忙果	*Cerbera manghas*	Minor Mangroves
17		海岛藤	*Gymnanthera nitida*	
18	豆科 Leguminosae	鱼藤	*Derris trifoliata*	
19	红树科 Rhizophoraceae	木榄	*Bruguiera gymnorhiza*	True Mangroves
20		海莲	*Bruguiera sexangula*	True Mangroves
21		角果木	*Ceriops tagal*	True Mangroves
22		秋茄	*Kandelia obovata*	True Mangroves
23	千屈菜科 Lythraceae	无瓣海桑	*Sonneratia apetala*	True Mangroves
24		海桑	*Sonneratia caseolaris*	True Mangroves
25	玉蕊科 Lecythidaceae	玉蕊	*Barringtonia racemosa*	Minor Mangroves
26	卤蕨科 Acrostichaceae	卤蕨	*Acrostichum aureum*	Minor Mangroves

Phytoplankton

No.	Family	Chinese Name	Latin Name
1	硅藻门 Bacillariophyta	菱形藻 1	*Nitzschia sp.1*
2		菱形藻 2	*Nitzschia sp.2*
3		布纹藻	*Cymbella sp.*
4		舟形藻 1	*Navicula sp.1*
5		舟形藻 2	*Navicula sp.2*
6		舟形藻 3	*Navicula sp.3*
7		微型舟形藻	*Navicula minima*
8		小环藻 1	*Cyclotella sp.1*
9		小环藻 2	*Cyclotella sp.2*
10		羽纹藻	*Pinnularia sp.*
11		骨条藻	*Skeletonema costatum*
12		短缝藻	*Eunotia sp.*
13		冠盘藻	*Stephanodiscus sp.*
14	绿藻门 Chlorophyta	卵囊藻	*Oocystis sp.*
15		纤维藻	*Ankistrodesmus sp.*
16		小球藻	*Chlorella sp.*
17		鼓藻	*Cosmarium sp.*
18		空星藻	*Coelastrum sphaericum*
19		月牙藻	*Selenastrum bibraianum*
20		四球藻	*Tetrachlorella sp.*
21	蓝藻门 Cyanophyta	色球藻	*Chroococcus sp.*
22		棒胶藻	*Rhabdogloea sp.*
23	裸藻门 Euglenophyta	裸藻	*Euglena sp.*
24	隐藻门 Cryptophyta	隐藻属	*Cryptomonas sp.*
25	甲藻门 Dinophyta	裸甲藻	*Gymnodinium sp.*
26	金藻门 Chrysophyta	鱼鳞藻	*Mallomonas*

Zooplankton

No.	Family	Chinese Name	Latin Name
1	砂壳科 Difflugidae	针棘匣壳虫	*Centropyxis aculeata*
2	铃壳纤毛虫科 Codonellidae	贪婪铃壳虫	*Codonella rapa*
3	中缢虫科 Mesodiniidae	红中缢虫	*Mosodinium rubrum*
4	急游虫科 Strombidiidae	锥形急游虫	*Strombidium conicum*
5	栉毛科 Didiniidae	双环栉毛虫	*Didinium nasutum*
6	长吻虫科 Lacrymariidae	天鹅长吻虫	*Lacrymaria olor*
7	草履科 Parameciidae	尾草履虫	*Paramecium caudatum*
8	四膜科 Tetrahymenidae	梨形四膜虫	*Tetrahymena pyriformis*
9	鞘居科 Vaginicolidae	袋扉门虫	*Thuricola folliculata*
10	游仆科 Euplotidae	游仆虫	*Euplotes sp.*
11	锤吸管虫科 Tokophryidae	浮萍锤吸管虫	*Tokophrya lemnarum*
12	臂尾轮科 Brachionidae	萼花臂尾轮虫	*Brachionus calyciflorus*
13		壶形臂尾轮虫	*Brachionus urceus*
14	三肢轮虫科 Filinidae	长三肢轮虫	*Filinia longisela*
15	仙達溞科 Sididae	短尾秀体溞	*Diaphanosoma brachyurum*
16	裸腹溞科 Moinidae	裸腹溞	*Moina sp.*
17	粗毛溞科 Macrothricidae	多刺粗毛溞	*Macrothrix spinosa*
18	盘肠溞科 Chydoridae	尖额溞	*Alona sp.*
19	纺锤水蚤科 Acartiidae	克氏纺锤水蚤	*Acartia clausi*
20	真哲水蚤科 Eucalanidae	亚强次真哲水蚤	*Subeucalanus subcrassus*
21	拟哲水蚤科 Paracalanidae	小拟哲水蚤	*Paracalanus parvus*
22	伪镖水蚤科 Psedodiaptomidae	安氏伪镖水蚤	*Pseudodiaptomus annandalei*
23	长腹剑水蚤科 Oithonidae	拟长腹剑水蚤	*Oithona similis*
24	剑水蚤科 Cycloopidae	广布中剑水蚤	*Mesocyclops leuckarti*
25	日猛水蚤科 Tisbidae	分叉小猛水蚤	*Tisbe furcata*
26	长足猛水蚤科 Longipidiidae	花冠长足猛水蚤	*Longipedia coronata*

Benthic Animals

No.	Family	Chinese Name	Latin Name
1	颤蚓科 Tubificidae	霍普水丝蚓	*Limnodrilus hoffmeisteri*
2	小头虫科 Capitellidae	小头虫	*Capitella capitata*
3	沙蚕科 Nereididae	羽须鳃沙蚕	*Dendronereis pinnaticirris*
4		腺带刺沙蚕	*Neanthes glandicincta*
5		溪沙蚕	*Namalycastis abiuma*
6	齿吻沙蚕科 Nephtyidae	寡鳃齿吻沙蚕	*Nephthys oligobranchia*
7	裂虫科 Syllinae	裂虫	*Syllis sp.*
8	缨鳃虫科 Sabellidae	尖刺樱虫	*Potamilla acuminata*
9	欧文虫科 Oweniidae	欧文虫	*Sigambra hanaokai*
10	单指虫科 Cossuridae	双形拟单指虫	*Cossurella dimorpha*
11	海稚虫科 Spionidae	凿贝才女虫	*Polydorra ciliata*
12	丝鳃虫科 Cirratulidae	刚鳃虫	*Chaetozone setosa*
13	石磺科 Onchidiidae	石磺	*Onchidium struma*
14	膀胱螺科 Physidae	尖膀胱螺	*Physa acuta*
15	扁蜷螺科 Planorbidae	扁旋螺	*Gryaulus compressus*
16	耳螺科 Ellobiidae	奥克肋耳螺	*Laemodonta octanfracta*
17		黑环左氏螺	*Laemodonta punctatostriata*
18		米氏耳螺	*Ellobium aurismidae*
19	滨螺科 Littorinidae	拟滨螺	*Littoraia sp.*
20	汇螺科 Potamodidae	拟蟹守螺	*Cerithidea sp.*
21		中华拟蟹守螺	*Cerithidea sinensis*
22	金环螺科 Iravadiidae	剑叶金环螺	*Fairbankia cochinchinensis*
23		锦绣金环螺	*Iravadia ornata*
24	拟沼螺科 Assimineidae	短拟沼螺	*Assiminea brevicula*
25	盘螺科 Valvatidae	鱼盘螺	*Valvata piscinalis*
26	跑螺科 Thiaridae	斜肋齿蜷	*Sermyla riqueti*
27		斜粒粒蜷	*Tarebia granifera*
28	狭口螺科 Stenothyridae	光滑狭口螺	*Stenothyra glabra*
29	玉螺科 Naticidae	褐玉螺	*Natica spadicea*
30	凯利蛤科 Kellidae	米埔假蛄蛤	*Pseudopythina maipoensis*
31	蓝蛤科 Corbulidae	光滑河篮蛤	*Potamocorbula laevis*
32	蚶科 Arcidae	橄榄蚶	*Estellarca olivacea*
33	杓蛤科 Cuspidariidae	皱纹杓蛤	*Cuspidaria corrugata*
34	钩虾科 Grmmaridae	钩虾	*Grmmarus sp.*
35	蜾蠃蜚科 Corophiidae	中华蜾蠃蜚	*Corophium sinensis*

No.	Family	Chinese Name	Latin Name
36	对虾科 Penaeidae	新对虾幼体	*Metapenaeus sp.*
37		对虾	*Penaeus sp.*
38	沙蟹科 Ocypodidae	宁波泥蟹	*Ilyoplax ningpoensis*
39		台湾泥蟹	*Ilyoplax formosensis*
40		悦目大眼蟹	*Macrophthalmus erato*
41		弧边招潮蟹	*Uca arcuata*
42	梭子蟹科 Porunidae	拟穴青蟹	*Scylla Paramamosain*
43	弓蟹科 Varunidae	侧足厚蟹	*Helice latimera*
44		秉氏厚蟹	*Helice pingi*
45		字纹弓蟹	*Varuna litterata*
46	相手蟹科 Sesarminae	明显新胀蟹	*Neosarmatium tangi*
47		双齿近相手蟹	*Sesarma bidens*
48		无齿螳臂相手蟹	*Chiromantes dehaani*
49		褶痕拟相手蟹	*Parasesarma plicatum*
50		中华中相手蟹	*Sesarmops sinensis*
51	虻科 Tabanidae	虻科幼虫	*Tabanidae sp.*
52	塘鳢科 Eleotridae	中华乌塘鳢	*Bostrychus sinensis 10*
53	虾虎鱼科 Gobiidae	弹涂鱼	*Periophthalmus modestus*
54		虾虎鱼	*Glossogobius sp.*
55		红狼牙虾虎鱼	*Odontamblyopus rubicundus*
56		阿部鲻虾虎鱼	*Mugilogobius abei*
57		子陵吻虾虎鱼	*Rhinogobius giurinus*

Insects

No.	Family	Chinese Name	Latin Name
1	叶甲科 Chrysomelidae	斑鞘豆肖叶甲	*Pagria signata*
2		瘤叶甲	*Chlamisus sp.*
3	瓢虫科 Coccinellinae	六斑月瓢虫	*Menochilus sexmaculata*
4		孟氏隐唇瓢虫	*Cryptolaemus montrouzieri*
5		双带盘瓢虫	*Lemnia biplagiata*
6	花蚤科 Mordellidae	花蚤	*Mordellidae*
7	金龟科 Scarabaeidae	双斑短突花金龟	*Glycyphana nicobarica*
8	裳蛾科 Erebidae	短带三角夜蛾	*Trigonodes hyppasia*
9		毛胫夜蛾	*Mocis undata*

No.	Family	Chinese Name	Latin Name
10	榕蛾科 Phaudidae	广州榕蛾	*Phauda kantonensis*
11		黑端榕蛾	*Phauda flammans*
12	裳蛾科 Erebidae	偶双点裳蛾	*Gesonia obeditalis*
13	绢蛾科 Scythrididae	黄斑绢蛾	*Eretmocera impactella*
14	瘤蛾科 Nolidae	鼎点钻夜蛾	*Earias cupreoviridis*
15	草螟科 Crambidae	甜菜白带野螟	*Spoladea recurvalis*
16	尺蛾科 Geometridae	豹尺蛾	*Dysphania militaris*
17	灰蝶科 Lycaenidae	银线灰蝶	*Spindasis lohita*
18		毛眼灰蝶	*Zizina otis*
19	弄蝶科 Hesperiidae	红翅长标弄蝶	*Telicota ancilla*
20	蛱蝶科 Nymphalidae	小眉眼蝶	*Mycalesis mineus*
21	蜜蜂科 Apidae	中华蜜蜂	*Apis cerana*
22		无垫蜂	*Amegilla sp.*
23		南方芦蜂	*Ceratina cognata*
24	隧蜂科 Halictidae	隧蜂属	*Halictus sp.*
25	泥蜂科 Sphecidae	长背泥蜂	*Ampulex sp.*
26		黄柄壁泥蜂	*Sceliphron madraspatanum*
27	方头泥蜂科 Crabronidae	方头泥蜂属	*Crabro sp.*
28	切叶蜂科 Megachilidae	切叶蜂	*Megachile sp.*
29	土蜂科 Scoliidae	土蜂	*Scolia superciliaris sauteri*
30		红腹土蜂	*Liacos erythrosoma*
31	胡蜂科 Vespidae	点马蜂	*Polistes stigma*
32		带铃腹胡蜂	*Ropalidia fasciata*
33		香港铃腹胡蜂	*Ropalidia hongkongensis*
34		原野华丽蜾蠃	*Delta campaniforme*
35		果马蜂	*Polistes olivaceus*
36		黄腰胡蜂	*Vespa affinis*
37		黑盾胡蜂	*Vespa bicolor*
38	蚁科 Formicidae	长角立毛蚁	*Paratrechina longicornis*
39		入侵红火蚁	*Solenopsis invicta*
40		拟黑多刺蚁	*Polyrhachis dives*
41		黑头酸臭蚁	*Tapinoma melanocephalum*
42		尼科巴弓背蚁	*Camponotus nicobarensis*
43		细足捷蚁	*Anoplolepis gracilipes*
44	蜻科 Libellulidae	黄蜻	*Pantala flavescens*
45		红蜻	*Crocothemis servilia*
46		高翔莽蜻	*Macrodiplax cora*

No.	Family	Chinese Name	Latin Name
47	蜻科 Libellulidae	狭腹灰蜻	*Orthetrum sabina*
48		华斜痣蜻	*Tramea virginia*
49		斑丽翅蜻	*Rhyothemis variegata*
50	蟌科 Coenagrionoidea	褐斑异痣蟌	*Ischnura senegalensis*
51	锥头蝗科 Pyrgomorphidae	短额负蝗	*Atractomorpha sinensis*
52	剑角蝗科 Acrididae	中华剑角蝗	*Acrida cinerea*
53	斑翅蝗科 Oedipodidae	花胫绿纹蝗	*Aiolopus thalassinus*
54	草螽科 Conocephalidae	斑翅草螽	*Conocephalus maculatus*
55	斑翅蝗科 Oedipodidae	疣蝗	*Trilophidia annulata*
56	虹翅螳科 Iridopterygidae	海南透翅螳	*Tropidomantis gressitti*
57	蝶角蛉科 Ascalaphidae	黄脊蝶角蛉	*Ascalohybris subjacens*
58	虱蝇科 Hippoboscidae	虱蝇	*Hippoboscidae*
59	广口蝇科 Platystomatidae	广口蝇	*Platystomatidae*
60	实蝇科 Tephritidae	鬼针长唇实蝇	*Dioxyna bidentis*
61	蜂虻科 Bombyliidae	黑翅蜂虻	*Ligyra tantalus*
62	蚜蝇科 Syrphidae	黑跗斑眼蚜蝇	*Eristalinus quinquestriatus*
63		东方粗股蚜蝇	*Syritta orientalis*
64		黄腹狭口蚜蝇	*Asarkina porcina*
65	寄蝇科 Tachinidae	塔克优寄蝇	*Eutheria tuckeri*
66	广翅腊蝉科 Ricaniidae	斑点广翅蜡蝉	*Ricania guttata*
67	角蝉科 Membracidae	三刺角蝉	*Tricentrus sp.*
68	沫蝉科 Cercopidae	沫蝉	*Cercopidae*
69	璐蜡蝉科 Lophopidae	蔗短足蜡蝉	*Lophops carinata*
70	瓢蜡蝉科 Issidae	球瓢蜡蝉属	*Hemisphaerius sp.*
71	红蝽科 Pyrrhocoridae	联斑棉红蝽	*Dysdercus poecilus*
72	长蝽科 Lygaeidae	黑带红腺长蝽	*Graptostethus servus*
73	蝽科 Pentatomidae	二星蝽	*Eysacoris guttiger*
74	猎蝽科 Reduviidae	彩纹猎蝽	*Euagoras plagiatus*
75	缘蝽科 Coreidae	小棒缘蝽	*Gralliclava horrens*
76		红背安缘蝽	*Anoplocnemis phasiana*
77		条蜂缘蝽	*Riptortus linearis*
78	蛛缘蝽科 Alydidae	多变圆龟蝽	*Coptosoma variegata*
79	龟蝽科 Plataspidae	亚铜平龟蝽	*Brachyplatys subaeneus*

Birds

No.	Family	Chinese Name	Latin Name	National Alien Invasive Species List
1	翠鸟科 Alcedinidae	普通翠鸟	*Alcedo atthis*	
2		斑鱼狗	*Ceryle rudis*	
3		白胸翡翠	*Halcyon smyrnensis*	Second Class
4	蜂虎科 Meropidae	栗喉蜂虎	*Merops philippinus*	Second Class
5	鸽鸠科 Columbidae	珠颈斑鸠	*Spilopelia chinensis*	
6		山斑鸠	*Streptopelia orientalis*	
7	秧鸡科 Rallidae	白胸苦恶鸟	*Amaurornis phoenicurus*	
8		白骨顶	*Fulica atra*	
9		黑水鸡	*Gallinula chloropus*	
10	反嘴鹬科 Recurvirostridae	黑翅长脚鹬	*Himantopus himantopus*	
11		反嘴鹬	*Recurvirostra avosetta*	
12	鸻科 Charadriidae	环颈鸻	*Charadrius alexandrinus*	
13		金眶鸻	*Charadrius dubius*	
14		铁嘴沙鸻	*Charadrius leschenaultii*	
15		金鸻	*Pluvialis fulva*	
16		灰鸻	*Pluvialis squatarola*	
17	鸥科 Laridae	红嘴鸥	*Chroicocephalus ridibundus*	
18	鹬科 Scolopacidae	矶鹬	*Actitis hypoleucos*	
19		黑腹滨鹬	*Calidris alpina*	
20		大沙锥	*Gallinago megala*	
21		扇尾沙锥	*Gallinago gallinago*	
22		黑尾塍鹬	*Limosa limosa*	
23		白腰杓鹬	*Numenius arquata*	Second Class
24		中杓鹬	*Numenius phaeopus*	
25		林鹬	*Tringa glareola*	
26		青脚鹬	*Tringa nebulatia*	
27		泽鹬	*Tringa stagnatilis*	
28		红脚鹬	*Tringa totanus*	
29		翘嘴鹬	*Xenus cinereus*	
30	鸬鹚科 Phalacrocoracidae	普通鸬鹚	*Phalacrocorax carbo*	
31	杜鹃科 Cuculidae	八声杜鹃	*Cacomantis merulinus*	
32		褐翅鸦鹃	*Centropus sinensis*	Second Class
33		四声杜鹃	*Cuculus micropterus*	
34		噪鹃	*Endynamys scolopaceus*	
35		鹰鹃	*Hierococcyx sparverioides*	

No.	Family	Chinese Name	Latin Name	National Alien Invasive Species List
36	鹎科 Pycnonotidae	白喉红臀鹎	*Pycnonotus aurigaster*	
37		红耳鹎	*Pycnonotus jocosus*	
38		白头鹎	*Pycnonotus sinensis*	
39	伯劳科 Laniidae	棕背伯劳	*Lanius schach*	
40	鸫科 Turdidae	乌鸫	*Turdus mandarinus*	
41	鹡鸰科 Motacillidae	树鹨	*Anthus hodgsoni*	
42		田鹨	*Anthus richardi*	
43		白鹡鸰	*Motacilla alba*	
44		黄鹡鸰	*Motacilla tschutschensis*	
45	椋鸟科 Sturnidae	八哥	*Acridotheres cristatellus*	
46		黑领椋鸟	*Gracupica nigricollis*	
47		灰椋鸟	*Spodilpsar cineraceus*	
48		丝光椋鸟	*Spodiopsar sericeus*	
49		灰背椋鸟	*Sturnia sinensis*	
50	柳莺科 Phylloscopidae	褐柳莺	*Phylloscopus fuscatus*	
51		黄眉柳莺	*Phylloscopus inornatus*	
52	梅花雀科 Estrildidae	斑文鸟	*Lonchura punctulata*	
53		白腰文鸟	*Lonchura striata*	
54	山雀科 Paridae	大山雀	*Parus major*	
55	扇尾莺科 Cisticolidae	长尾缝叶莺	*Orthotomus sutorius*	
56		黄腹鹪莺	*Prinia flaviventris*	
57		褐头鹪莺	*Prinia inornata*	
58		黄腹山鹪莺	*Prinia flaviventris*	
59		纯色山鹪莺	*Prinia inornata*	
60	苇莺科 Acrocephalidae	东方大苇莺	*Acrocephalus orientalis*	
61		黑眉苇莺	*Acrocephalus bistrigiceps*	
62	鹟科 Muscicapidae	鹊鸲	*Copsychus saularis*	
63		北红尾鸲	*Phoenicurus auroreus*	
64		黑喉石鹏	*Saxicola maurus*	
65	鹀科 Emberizidae	灰头鹀	*Emberiza spodocephala*	
66	绣眼鸟科 Zosteropidae	暗绿绣眼鸟	*Zosterops japonicus*	
67	鸦科 Corvidae	大嘴乌鸦	*Corvus macrorhynchos*	
68		白颈鸦	*Corvus pectoralis*	
69		喜鹊	*Pica pica*	
70		红嘴蓝鹊	*Urocissa erythroryncha*	
71	燕科 Hirundinidae	家燕	*Hirundo rustica*	
72	噪鹛科 Leiothrichidae	黑脸噪鹛	*Garrulax perspicillatus*	
73	卷尾科 Dicruridae	发冠卷尾	*Dicrurus hottentottus*	
74		黑卷尾	*Dicrurus macrocercus*	First Class
75	鹮科 Threskiornithidae	黑脸琵鹭	*Platalea minor*	
76	鹭科 Ardeidae	大白鹭	*Ardea alba*	
77		苍鹭	*Ardea cinerea*	
78		中白鹭	*Ardea intermedia*	
79		池鹭	*Ardeola bacchus*	
80		牛背鹭	*Bubulcus ibis*	
81		白鹭	*Egretta garzetta*	
82		夜鹭	*Nycticorax nycticorax*	
83		栗苇鳽	*Ixobrychus cinnamomeus*	
84	鸭科 Anatidae	针尾鸭	*Anas acuta*	
85		绿翅鸭	*Anas crecca*	
86		凤头潜鸭	*Aythya fuligula*	
87		赤颈鸭	*Mareca penelope*	
88		琵嘴鸭	*Spatula clypeata*	
89	雨燕科 Apodidae	小白腰雨燕	*Apus nipalensis*	Second Class
90	鹰科 Accipitridae	普通鵟	*Buteo japonicus*	Second Class
91		黑鸢	*Milvus migrans*	Second Class
92		白腹鹞	*Circus spilonotus*	
93	啄木鸟科 Picidae	蚁䴕	*Jynx torquilla*	

Mammals

No.	Family	Chinese Name	Latin Name	National Alien Invasive Species List
1	鼠科 Mridae	褐家鼠	*Rattus norvegicus*	
2	猪科 Suidae	野猪	*Sus scrofa*	
3	灵猫科 Viverridae	小灵猫	*Viverricula indica*	First Class
4	猫科 Felidae	豹猫	*Prionailurus bengalensis*	Second Class
5	鼬科 Mustelidae	欧亚水獭	*Lutra lutra*	Second Class
6	狐蝠科 Pteropodidae	短耳犬蝠	*Cynopteru sbrachyotis*	
7	蝙蝠科 Vespertilionidae	东亚伏翼	*Pipistrellus abramus*	

Plant Survey Results of the Memorial Garden

Quadrat Size：2m x 2m，Date：October 2021

Camera No.1

Name	Coverage	Height (cm)	Note
Mimosa bimucronata	40.0%	40–50	Invasive Species
Bidens pilosa	30.0%	30–40	
Leucaena leucocephala	5.0%	230	Invasive Species
Neyraudia reynaudiana	3.0%	40–50	
Hedyotis auricularia	2.0%	20–50	

Camera No.1 site is dominated by *Mimosa bimucronata*, with more herbaceous vegetation, and the vegetation coverage is more than 80%, mainly *Mimosa bimucronata*, *Bidens pilosa*, *Leucaena leucocephala*, *Neyraudia reynaudiana* and other plants. Dense, the overall height is about 40-50cm. Invasive species are the dominant species.

Camera No.2

Name	Coverage	Height (cm)	Note
Mimosa bimucronata	50.0%	30–40	Invasive Species
Neyraudia reynaudiana	30.0%	50–130	
Desmodium tortuosum	15.0%	60–170	
Bidens pilosa	5.0%	30–40	Invasive Species
Sesbania cannabina	1.0%	50	

Camera No.2 site is mainly dominated by *Mimosa bimucronata*, with more herbaceous vegetation, and the vegetation coverage is more than 90%, mainly *Bidens pilosa*, *Neyradia reynaudiana*, *Desmodium tortuosum* and other plants. Sparse, the overall height is about 40-60cm. Invasive species are the dominant species.

Camera No.3

Name	Coverage	Height (cm)	Note
Mimosa bimucronata	50.0%	30–40	Invasive Species
Neyraudia reynaudiana	5.0%	40–80	

Camera No.3 site is dominated by *Mimosa bimucronata*, with more herbaceous vegetation, and the vegetation coverage is more than 55%, mainly *Neyraudia reynaudiana* and other plants. Sparse, the overall height is about 30-80cm. Invasive species are the dominant species.

Camera No.4

Name	Coverage	Height (cm)	Note
Bidens pilosa	80.0%	30–40	Invasive Species
Panicum bisulcatum	5.0%	40–50	
Mimosa bimucronata	3.0%	40–50	Invasive Species

Camera No.4 site is dominated by *Bidens pilosa*, with more herbaceous vegetation, and the vegetation coverage is more than 88%, mainly *Bidens pilosa*, *Mimosa bimucronata* and other plants. Dense, the overall height is about 40-50cm. Invasive species are the dominant species.

Camera No.5

Name	Coverage	Height (cm)	Note
Alysicarpus vaginalis	80.0%	50–80	
Cyperus odoratus	8.0%	20–35	
Mimosa pudica	5.0%	10~20	
Bidens pilosa	3.0%	20–30	Invasive Species
Panicum bisulcatum	3.0%	50–70	
Imperata cylindrica	3.0%	40	
Sesbania cannabina	1.0%	30–40	

Camera No.5 site is mainly dominated by *Alysicarpus vaginalis*, with more herbaceous vegetation, and the vegetation coverage is more than 90%, mainly *Bidens pilosa*, *Cyperus odoratus* and other plants. Dense, the overall height is about 20-50cm. Native species are the dominant species.

Camera No.6

Name	Coverage	Height (cm)	Note
Mimosa bimucronata	95.0%	30–50	Invasive Species
Bidens pilosa	3.0%	25–70	Invasive Species
Panicum bisulcatum	3.0%	50–70	
Mikania micrantha	1.0%	15	Invasive Species
Passiflora foetida	1.0%	20–30	

Camera No.6 site is dominated by *Mimosa bimucronata*, with more herbaceous vegetation, and the vegetation coverage is more than 98%, mainly *Bidens pilosa*, *Panicum bisulcatum* and other plants. *Mimosa bimucronata* grows luxuriantly in the east of the southern area. Dense, the overall height is about 20-70cm. Invasive species are the dominant species.

Camera No.7

Name	Coverage	Height (cm)	Note
Sphagneticola trilobata	50.0%	30–40	
Arundo donax	20.0%	40–50	
Phragmites australis	5.0%	40–60	
Trema tomentosa	5.0%	55	
Bidens pilosa	3.0%	25–70	Invasive Species

Camera No.7 site is mainly dominated by *Sphagneticola trilobata*, with more herbaceous vegetation, and the vegetation coverage is more than 80%, mainly *Arundo donax*, *Bidens pilosa*, *Trema tomentosa* and other plants, and more *Sphagneticola trilobata* on the west side. Dense, the overall height is about 30-60cm. Alien species are the dominant species.

Camera No.8

Name	Coverage	Height (cm)	Note
Imperata cylindrica	20.0%	30–40	
Zoysia japonica	20.0%	5–10	
Cyperus difformis	6.0%	20–30	
Alysicarpus vaginalis	5.0%	20–30	
Mimosa bimucronata	2.0%	5–11	Invasive Species
Dolomiaea saussureoides	1.0%	10–20	
Phyllanthus urinaria	0.5%	10	

Zoysia japonica and *Imperata cylindrica* are the main species in the camera No. 8 site. There are more herbaceous vegetations, and the vegetation coverage is more than 50%, mainly *Cyperus difformis*, *Alysicarpus vaginalis* and other plants. Sparse, the overall height is about 5-30cm. Alien species are the dominant species.

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(in order of last name Chinese character strokes)

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