PIONEER
ACADEMIC PUBLISHING LIMITED

Journal of Research in Social Science and Humanities
ISSN 2709-1910
www.pioneerpublisher.com/jrssh
Volume 2 Number 3 March 2023

A New World of Lakes—An Exploration of the Code for a New Low Carbon Realm—The Upgrading of Horticultural Lake in Mianyang Science City New District as an Example

Chong Kang[1]

[1] Southwest University of Science and Technology
Correspondence: Chong Kang, Southwest University of Science and Technology.

doi:10.56397/JRSSH.2023.03.07

Abstract

This paper focuses on the upgrading project of Horticulture Lake in China's Science and Technology City-Miangyang, and summarizes the seven major problems of the current situation by sorting out the problems of the current situation of Horticulture Lake. With natural ecology and green sponge as the design concept of renovation and upgrading, seven major renovation and upgrading measures are proposed, such as the code of lake ecology, the code of three-dimensional ecological lake scape, the code of green ecological sponge, the code of road system upgrading, the code of flower border upgrading, the code of plant landscape upgrading and the code of ground cover upgrading of Song Shou Lan, in order to create a new scene of green technology and low-carbon life.

Keywords: park renovation, green ecology, lake view, plant transformation

1. Background

Mianyang is the only science and technology city in China, the second largest economy in Sichuan, the third city in the Chengdu-Chongqing twin-city economic circle, the regional deputy centre of Sichuan Province and is served as the Secretary of the Mianyang Municipal Committee by Comrade Cao Lijun, a member of the Standing Committee of the Provincial Party Committee. Since its birth, Mianyang Science and Technology City New District has been aiming at new coordinates, practicing the concept of innovative development and ecological practice demonstration, closely focusing on science and technology, green and low-carbon to do top-level design and practice demonstration.

2. Importance of Upgrading the Horticultural Lake

Comrade Xi Jinping pointed out that "everyone is a protector, builder and beneficiary of the ecological environment, no one is an observer, outsider or critic, no one can just say or do nothing and stay out of it". The ecological environment is the people's livelihood, the green mountains are beautiful, and the blue sky is also happiness. The new area of Mianyang Science and Technology City follows the ecological concept of harmonious coexistence between man

and nature, builds a green lifestyle that is compatible with the development of the city, protects and makes good use of the ecological environment, and builds a high quality living environment with green water, green hills facing each other, grass and trees flourishing, and flowers and birds as neighbours; during the daytime, you can see greenery when you push the window, and the blue sky and white clouds when you look up; at night, you can see the twinkling stars and listen to the sound of insects. This is the common desire and pursuit of a better green future in the hearts of the citizens.

The transformation and upgrading of the ecological environment and ecological value of Horticulture Lake in the new area of Science and Technology City reflects the ecological charm of Horticulture Lake, making it a better ecological environment, making it greener and more low-carbon, and allowing the ecological dividends to benefit more citizens. A new world with a lake, a realm of the heart.

3. Basic Information About Horticultural Lake

Horticultural Lake is located in the Horticultural Hill Group of the New Science and Technology City and was first built in 2003, covering an area of 164 acres. The lake covers an area of 74 mu of water and 90 mu of greenery. The deepest part of the lake is 4.8 metres and the shallowest part. The lake is fed by an underground natural spring and is recharged daily by rainwater collection and purification and tap water in the area. The Horticulture Lake, which has been in operation for nearly 20 years, has a rich variety of trees and a good ecological background; it is surrounded by public buildings such as the Innovation Centre of Science and Technology City, the Mianyang Urban Planning Exhibition Hall and the China Institute of Advanced Technology in Science and Technology City; it also serves the residents of high-end talent homes and residential areas such as Ao Lin Spring and China Resources Central Park, so its location is very important.

Figure 1.

4. Main Problems of the Horticultural Lake

1) The main garden path is 2.2 metres wide and there are three steps.

2) The paving material is sintered floor tiles and is heavily deteriorated.

3) Lack of water-friendly platforms, bridges and the inability of visitors to interact with the water landscape.

4) More tall trees, shade in the garden, poor ground cover and flowering plants. Amount of green, little colour; trees, little ground cover.

5) Lack of supporting related facilities, lack of fitness areas, equipment.

6) Inability to move water bodies, more severe eutrophication of water bodies, turbidity of raw water bodies and a certain odour in summer.

7) The lake and its shores lack water purifying and ornamental aquatic plants, and the ecology and landscape of the water body is poor.

5. Seven Ecological and Low-Carbon Codes for Upgrading Horticultural Lakes

Technical route: natural ecology, green sponge body for horticultural lake upgrade for the design concept, the lake bottom, shore, green space, roads, plants all-round implantation of ecological sponge body gene, so that ecological elements three-dimensional, chain, integrated, lakescape ecological green, sponge, so as to achieve green, low-carbon, zero discharge of the virtuous cycle.

The horticultural lake, which has been built for nearly 20 years, is lush and green; the lake is spacious and has a good ecological background. Tall trees such as balsam fir, mountain acacia, sequoia and willow with a diameter at breast

height of 30-50 cm.

Six large yellow kudzu trees with a diameter of 60-80 cm at breast height; nearly 1,000 geraniums planted in the ecological isolation zone around the park; purple-leaved plum, plum blossom, cherry blossom, pomegranate, hibiscus and purple bush flower blooming in season, with obvious seasonal phases.

(1) Lake water ecology code: in response to the current situation of turbid water, eutrophication and odour in summer, the lake was upgraded by dredging the 50-60 cm silt at the bottom of the lake. The silt was exposed to the sun and dried after the lake was drained, and the dried silt was finely crushed and reused for green space. The bottom of the lake is fully disinfected after dredging and exposure; the bottom and the barge 50 cm above the normal water body are paved with anti-silt, permeable geotextile; backfilling of the lake bottom and barge with 30 cm thick yellow clay and compaction to waterproof the lake water infiltration. A tarp is laid over the top, backfilled with 30 cm thick planting soil and sterilised to create a good carrier for aquatic plant communities.

(2) The three-dimensional ecological lakescape code: on the premise of building up the impermeability of the horticultural lake and planting carriers at the bottom of the lake, the bottom of the lake is inoculated with beneficial bacteria, and nearly 2,000 tons of Ful River landscape stones of 960 pieces along the barges and small islands of the lake, which are conducive to the construction of landscape and habitat; a stable skeleton of the water ecosystem of the horticultural lake is formed by all habitat elements such as barges, lake water, landscape stones and lake islands. As water is poured into the lake, algae and bitter grass aquatic plants are gradually planted artificially from deep water to shallow water, and ornamental grasses of nearly 2,600 square metres are planted around the lake shore and on the lake island; 430 square metres of lotus flowers are planted in the shallow water of 1.2 metres. The lake is a green “underwater forest”, which is a dynamic balance of the ecological cycle of Horticulture Lake. The upgraded Horticultural Lake does not need to rely on artificial oxygen supplementation, no additional energy consumption, through the benign cycle of the Horticultural Lake’s own ecosystem, to improve the self-purification cycle of the lake, the lake water is clear, water plants swaying, fish and shrimp play vivid water ecological world. Through dredging, the lake water quality is solved by turbidity and odour; the impermeable treatment maintains a stable water volume, maintains the lake landscape, and saves water, reducing the late maintenance costs of the lake landscape. Through the construction and restoration techniques of the three-dimensional aquascape of the horticultural lake, planting submerged and water-holding plant communities, stocking fish and snail and shellfish aquatic animal communities, the lake landscape is biologically diversified and three-dimensional.

(3) Green space ecological sponge code: comprehensive and systematic upgrading of the horticultural lake road system, the main and secondary garden roads and node gardens fully adopt highly permeable paving technology and implant ecological sponge genes. Grass ditches are built along the roads to intercept rainwater, prevent runoff and control surface source pollution; the barges enter the water using. Ecological isolation of plants to reduce direct rainfall into the lake during the rainy season. Multi-space and multi-technology for water purification purposes.

Figure 2.

(4) Road system upgraded to colour permeable ecological pavement code

i) Based on the original road alignment, the main garden road surface is widened from 2.5m to 4m; when the road is widened, there are large trees and characteristic flowers and trees in the road, the road is divided into two and the large trees and flowers and trees are wrapped in the road to form green islands and forest islands, the width of the garden road can reach 5-5.5m in such cases.

ii) The garden is guided by the topography of the landscape and the characteristic planting, and secondary paths of 2-2.5m wide are constructed on the inside or outside of the main garden paths to form an interesting trail featuring aesthetic and ecological experiences. The paths are either near the lake, among the flowers, beside the bamboo, under the forest, or extending to a wide lawn.

iii) The park has two main entrances, one in the east and one in the west, and five secondary entrances. In combination with the sloping terrain, there are three secondary entrances, which are accessed by the use of stepping stones. In order to reflect the green ecology, natural stones are used for the natural arrangement of the park; secondly, the stone joints. The gaps are planted with buddleia, yucca and thousand-leaved golden-leaf lily, depending on light and soil thickness.

iv) An ecological grass trench was constructed on the outside of the road to achieve the goal of green and low carbon and full sponge construction, to "collect" as much rainwater as possible from the park and to effectively compensate for the evaporation of water from the lake. The grassed ditches are laid out along the road, with a sinkhole every 25 metres, 50 cm deep and 60 cm wide, with tarpaulins lining the walls at the bottom of the ditch. Pile 2-4 cm gravel 30 cm, cover gravel with 2-3 cm river sand, backfill with 26-28 cm planting soil, then lay grass.

v) The road retaining wall is made of natural stone, and in order to build a low-carbon ecological park, construction materials such as cement and red bricks are not used as far as possible. Natural stone masonry is used for all retaining walls in the park, with ferns planted in the gaps and ornamental plants such as foliage on top of the retaining walls.

(5) Flower border upgrade horticultural lake landscape code

Horticultural Lake, the lake of horticultural ecology. Highlighting the diversity of horticulture and the ecological low-carbon nature of horticulture. The choice and configuration of plants in the garden focuses on the longevity of the landscape and the low maintenance of the management. In order to meet the new aspirations of the public for a new era of landscape gardening, 16 groups of flowering landscape were created in the upgrading of the Horticultural Lake, featuring close viewing and fine detail: perennial hostas and shrubs were chosen as the main flowers, flowers, leaves, fruits and shapes; skeleton shrubs, hosta themes, low filling three-dimensional composition; contrast in flower colour, contrast in texture, contrast in form, integration and symbiosis, with close viewing and fine detail, single-sided. In terms of species selection, the planting is a combination of evergreen shrubs + ornamental grasses + shade-tolerant ground cover + landscape rocks + dyed bark; it is colourful, artistic, refined and humane; in terms of landscaping techniques, it strives to achieve a variety of species, a combination of shade and sun, and various forms of landscaping such as framing, pairing and leakage. There are scenes of nearly 100 square metres, but also small flower borders of just over 10 square metres, highlighting the freshness of nature and low maintenance, so that the public can have a new look and a new view, to meet the new expectations and aspirations of the public for a better living environment in the new era.

The Horticultural Lake is a lake of low-carbon horticultural plants, with nearly 50 species of plants representing low maintenance in the flowering landscape: tortoise holly, alum root, hickory grass, cherry sage, torch flower, rich fern, flowering willow, golden-leaved iris, buddleia, thin-leaved manzanita, bright crystal lady's maidenhair, flowering leaf lox, snow spray, purple banana flower, hydrangea, flowering tobacco, Chinese Kingfisher, blue peony, knotweed, wufeng grass, etc.

Figure 3.

(6) Upgrading code for the plant landscape: the horticultural lake, which has been built for

nearly 20 years, has lush plants and a good ecological background.

i) Protected skeleton plants: tall trees such as balsam fir, mountain acacia, sequoia and willow with a diameter at breast height of 30-50 cm; yellow kudzu trees with a diameter at breast height of 50-80 cm; large shade crowns, undulating canopy lines, naturally charming; nearly two thousand geraniums in the background forest belt around the garden make the horticultural lake interface clear and green.

ii) Upgraded configuration of flowers and trees: The garden is rich in varieties of flowers and trees such as purple leaf plum, plum blossom, cherry blossom, pomegranate, magnolia, lohan pine, cattail, violet and begonia, but their growth and mix need to be optimised and upgraded. Some are too dense, some are disorganised, some are weak, some are too shaded and have grown into "toothpick trees", basically losing their ornamental and ecological qualities. The above-mentioned types of flowers and trees use targeted upgrading measures: First, according to the sparse and light conditions in the garden, the use of transplants in the garden, divided into seasonal phase grouping scenery. In the northern area, a foliage garden featuring red maple, purple leaf plum and sallow is formed; in the southern area, a spring garden featuring begonias, magnolias and cherry blossoms is formed; and a summer garden is formed by purple vetch, red thousand layers and hydrangeas. Secondly, some of the dense and weak flowering trees are moved out of the garden and planted near the Municipal Party School as greening for ecological restoration of the mountain.

Figure 4.

(7) Pinus sylvestris upgraded ground cover code

Native to Mexico, the Pine Shou Orchid is a genus of auspicious grass in the lily family: it is also known as western auspicious grass, purple clover and rich grass. It is used in the landscape of the woods during the upgrading of the horticultural lake. The lake, which has been in existence for nearly 20 years, has a good ecological background with its shady trees and tall cicadas. It is well protected and beneficial. Using the tall trees in the garden is the key to upgrading. Garden of tall trees balsam fir, yellow kudzu, luan, sienna, park trees, etc. is the skeleton of horticultural lake greenery, playing an irreplaceable huge ecological value. But these "big" tall trees, the amount of fallen leaves, long fallen leaves, leaves fall all over the sky, to the city cleaning and sanitation workers to clean up the huge trouble and workload, we suffer.

The pine orchid, also known as the rich grass, is evergreen, shade and drought tolerant, does not need to be pruned and is highly resistant; the plant reaches a height of 40 cm and the 2 cm wide upright linear leaves are rigid and flexible, the large number of deciduous leaves of tall trees such as balsam fir, which slide down the upright soft sword-shaped leaves to the base of the leaves, are completely hidden in the pine orchid. The 40cm tall Pine Sage orchid is the perfect place to hide and dispose of fallen leaves. The leaves fall between them and decay slowly, making it the perfect home for fallen leaves and truly

Figure 5.

6. Recommendations

On the western shore of Horticultural Lake, there is a gently sloping lawn of over 2,500 square metres, which follows the concept of green ecological values. The new area of Science and Technology City carries the new coordinates of science and technology innovation and green development of China's only science and

technology city, and should reflect technology, green, lowcarbon and uniqueness in terms of ecological value conversion space and facilities. It is recommended that the low-carbon radio wisdom space should be planned and built by drawing on the technology and low-carbon technologies of Yibin Times Park, Chongqing Liangjiang New Area Yuelai Bay, Shenzhen Centre River Park and Chengdu Tianfu New Area Luhu Ecological City, through photovoltaic power generation, sports power generation, green wind energy, solar panels and fluorescent new materials and technologies, and designing a fluorescent stone walkway with horticultural lake characteristics, solar charging seats, intelligent seats, sports power generation experience. The new green and low-carbon experience includes a light and shadow landscape, a water theatre, etc. Visitors who are tired and sleepy can recharge wirelessly while resting, realising the unique charm of the new scene of green technology and low-carbon life experience at Horticultural Lake.

References

Huang, Hai-Xiang. (2022). Strategies for urban park renovation and enhancement. *Jiangxi Jiancai*, (04), 292-293+298.

Jin Gao Yi, Dai Hui Zi, Liu Jun. (2022). Exploration of spongy transformation of urban parks—a park in Nanchong City as an example. *Chongqing Architecture, 21*(S1), 104-107.

Song Jia. (2022). Green infrastructure concept of town park renovation design strategy. *China Building Metal Structure*, (10), 148-150.

Wang Ding. (2022). Strategy of urban park landscape renovation and enhancement in the context of park city—a case study of the renovation and enhancement project of riverfront park in Wujiaqu City. *Xiandai Horticulture, 45*(13), 98-100. DOI:10.14051/j.cnki.xdyy.2022.13.007.