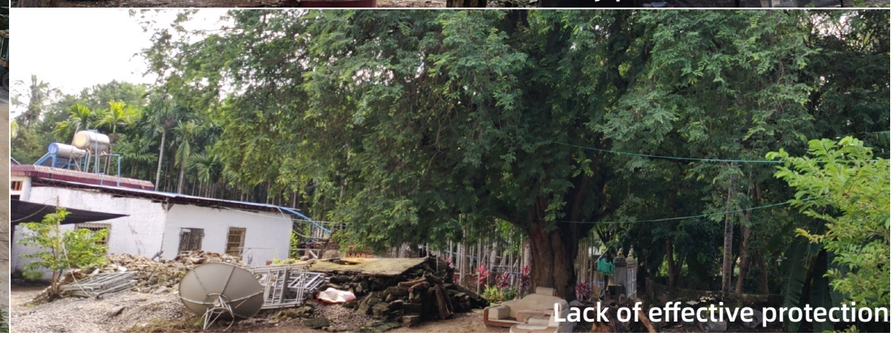
A NEW INTERPRETATION OF ANCIENT TREES

ECOLOGICAL RESTORATION PROJECT FOR ANCIENT TREE PROTECTION IN YAZHOU BAY SCIENCE AND TECHNOLOGY CITY, SANYA

Ancient trees, a rare and unique heritage in nature, are particularly abundant in Sanya, Hainan. These ancient tree resources, with their distinctive natural environment and rich historical background, offer unparalleled opportunities for the study and preservation of ancient tree culture. **Our restoration project, located in the Yazhou Bay Science and Technology Urban Area, is dedicated to protecting the existing 29 secondary ancient trees and their follow-up resources on site. Additionally, we plan to relocate 19 more ancient trees for unified protection in the future, further enhancing the richness of our ancient tree resources.**

The proportion of native ancient tree resources within the city is deficient in the overall resources of ancient trees, and they are a precious component of China's ancient tree resources. Due to their unique location in the city, they are more suitable as windows for carrying out ancient tree protection and science popularization compared to rural mountain and forest trees. The project team has adopted and implemented the "pro biological design" concept, focusing on protecting the site's precious natural and cultural resources so that more people can understand and recognize the uniqueness and value of ancient tree culture. The ancient tree resource protection base is a comprehensive park dedicated to ancient tree culture. It will be a demonstration area for centralized protection and management of ancient tree resources, a core venue for conducting ancient tree research and education activities, and a new highland for practicing the development and utilization of ancient tree values. **In the context of ecological civilization construction, the base will reinterpret the harmonious relationship between *"The city, people, and trees"*** .By repairing and transforming the ancient tree resource protection base, we can not only solve the problem of ancient trees constraining urban development but also make them witnesses and participants in the development of Yazhou Bay New City and establish a new model of harmonious coexistence between Yazhou Bay New City and nature.

PROJECT NARRATIVE



Natural ancient tree communities in tropical urban areas

Hainan Island is China's second-largest treasure island, with many biological resources and mainly tropical tree species. The Yazhou District, where the project is situated, has the richest resources of ancient and famous trees in Sanya City. There are 74 ancient trees and subsequent resources of ancient trees in the surrounding area; most of them are Tamarindus, also known as the city trees of Sanya. The tamarind is widely distributed in Sanya and has a long history of cultivation. It symbolizes the spirit of the people of Sanya, who are simple, resilient, brave to face difficulties, indomitable, and constantly striving.

Lack of protective measures and insufficient public awareness

People often emphasize the economic value of forests while neglecting their ecological value, resulting in severe phenomena including "heavy development, light protection," and "development before protection" in developing and utilizing ancient and famous tree resources. The ancient and famous tree resources in Sanya City are in a critical state, facing severe challenges of aging, decline, and quantity reduction. Their scattered locations, poor growth environment, and inadequate management have led to this dire situation. Urban construction and relocation activities near the base have further exacerbated the problem, with human destruction, overgrowth of weeds, and the emergence of plant diseases and pests posing serious threats to the health and safety of these ancient trees. It is imperative that we strengthen their protection and initiate rejuvenation efforts.

Specialized garden for restoring the habitat of ancient tree communities

The project team adopted a core approach to protecting ancient trees. It developed personalized care plans for each tree, implementing a management strategy of "one tree, one policy, one tree, one file." The proposal takes the ancient tree community as a core to delineate red lines in the protection area. The design identifies ancient trees that need protection and develops plans for an integrated management system. Ultimately, the plan will lead to an ancient tree habitat dedicated to protection and restoration. The project is a base for scientific research and education on ancient tree resources and an important measure to realize the value of excavation and protection of ancient trees.

The ancient tree resource protection base will become a core component of the new city park system. It will enhance the new city's vitality and appearance, highlight the characteristics of industry-city integration, create rich leisure experiences for citizens, and build a green ecological foundation.

In the future, this ancient tree resource protection base will become an ecologically friendly leisure park that integrates with the city, showcases the characteristics of the technology city, and is loved by citizens.

PROJECT NARRATIVE

Ancient tree resources within the base

There are 29 ancient trees and subsequent resources of ancient trees on the site, all Tamarindus. With the development and construction of surrounding cities, 19 Tamarindus will be relocated to the site. These ancient trees are currently in good condition, with the characteristic of "standing alone as a building and connected as clouds," and form a rich natural, historical memory of the site. They are critical ecological resources and landscape landmarks of the city.

Tamarindus

Tamarindus indica L.
Angiospermae >>Fabaceae >> Tamarindus
Synonym: Tamarindus officinalis, Tamarindus umbrosa
Evergreen trees
Originating from Comoros and Madagascar in Africa
Cultivated or wild in Taiwan, Fujian, Guangdong, Guangxi, Yunnan and other places in China

Design goals and concepts

The project design revolves around the model of harmonious coexistence between Yazhou Bay New City and nature, with the theme of "A New Interpretation of Ancient Trees", implementing the concept of "pro biological design," and creating a demonstration site for centralized protection and management of ancient tree resources on the site; The core area for conducting research and education on ancient tree resources; Practice the new highland of developing and utilizing the value of ancient trees, and reinterpret the new harmonious relationship of *"The city, people, and trees"* in the context of ecological civilization construction.

Strategy 1: Measures for Revitalizing Ancient Trees

According to the site investigation, the ancient tree's current problems are mainly due to its harsh growth environment, hardened ground, significant impact on the roots, disorderly construction around it, and even using it as a support, which seriously damages its health. Therefore, the main rejuvenation measures are to improve the growth environment, mainly the above-ground and underground environments.

Strategy 2: Smart guardianship measures

The project team will collaborate with the local government to build a monitoring system for ancient and famous trees. Through comprehensive real-time monitoring, the goal is to grasp and share information on ancient trees in a timely manner to prevent natural damage, prevent human damage, and rescue and restore them in a timely manner. The main monitoring content includes growth status, tree damage, physiological and metabolic indicators, and environmental monitoring.

Strategy 3: Public participation measures

To consolidate the protection and ecological foundation of ancient tree resources, we are committed to shaping this site into a centralized demonstration area to protect and manage ancient trees. The plan is not only the center of scientific research and education on ancient tree resources but also a pioneering area for exploring new models of value development and utilization of ancient trees, showcasing the new harmonious relationship between "city," "people," and "trees" in the era of ecological civilization. The project's planning is closely linked to urban development, complementing the functions of surrounding cities, providing clear landscape theme areas and functional positioning, and with a central image display area. To enhance the public's sense of participation, we have designed diverse leisure activity spaces, emphasizing humanized functional configuration, creating a rich travel network, complete service facilities, and continuous green shading to ensure that every visitor can enjoy a pleasant outdoor experience.

Conclusion

Ancient and famous trees preserve precious species resources, record the historical changes of nature, and inherit humanity's historical and cultural development. The project aims to protect the existing living environment of ancient trees in Sanya City, strengthen the protection of ancient and famous trees, and is of great significance for preserving the history of natural and social development, promoting advanced ecological culture, and promoting ecological civilization and the construction of a beautiful China.

Project size in SqM: 31391 ㎡
City of Project: Sanya, Hainan
Country of Project: China
Year of Planning: 2023-2024

ANCIENT TREE PROTECTION BASE: AN IMPORTANT COMPONENT OF SANYA CITY'S ECOSYSTEM

The ancient tree resource protection base located on the south side of Yazhou Bay Science and Technology City is adjacent to the Deep Sea Science and Technology City plate, echoing the Nanshan Ridge and forming a key ecological node of the integrated functional axis of the port and city with the rich landscape ecological resources in the surrounding area. The base has a superior geographical location, 2.4 kilometers away from Nanshan Port and 26 kilometers away from Sanya Phoenix International Airport.

The base is surrounded by beautiful natural scenery, providing excellent development potential for the project. The precious ancient tree resources inside complement the scientific research activities of the China Southern Breeding Center, and are expected to attract tourists from the southern and surrounding urban areas of the Deep Sea Science and Technology City, jointly promoting the comprehensive progress of the Science and Technology City.

Yazhou Ancient City

Ningyuan River Ecological Landscape Belt

Nanfan Park

Central Park

China Southern Breeding Center

Coastal Ecological and Cultural Belt

Urban functional leisure belt

Urban landscape exhibition belt

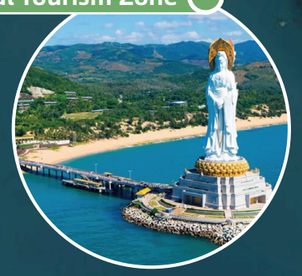
Tonghai Park

Yazhou Bay

SITE

Xiaoxiao Dongtian Tourist Area

Nanshan Cultural Tourism Zone



G1
Parkland
25697m²

A2
Land for cultural activities
5694m²

THE SITUATION AND DILEMMA OF ANCIENT TREE COMMUNITIES

There are 29 existing ancient trees on the site, and the surrounding 19 ancient trees will be relocated to the site in the future, all of which are Tamarindus.

Tamarindus, Evergreen trees

Tamarindus indica L.

Angiospermae >>Fabaceae >> Tamarindus

Synonym: Tamarindus officinalis, Tamarindus umbrosa

29 ancient Tamarindus trees

According to the ***"Regulations on the Protection and Management of Ancient and Famous Trees in Hainan Province"*** and the ***"Several Regulations on the Protection and Management of Ancient and Famous Trees in Sanya City"***:

- Ancient trees refer to trees that are over 100 years old;
- The follow-up resources of ancient trees refer to trees that are over 60 years old but less than 100 years old;
- Ancient trees that are over 300 years old shall be announced by the provincial people's government and shall be protected at the first level;
- Ancient trees that are over 100 years old but less than 300 years old shall be announced by the people's governments of cities, counties, and autonomous counties and shall be subject to secondary protection.

A.The growth space of ancient trees is squeezed by other trees

The current situation is that the surrounding area of ancient trees is covered with other trees, with small tree spacing, and situations such as lodging, parasitism, and pests and diseases have occurred, which is not conducive to the growth and protection of them.

B.The site is cut by Tce-city Road and does not form a whole

The site is divided into two parts by Science and Technology City Road, making it difficult to form a whole, and the western plot is narrow, with limited land use.

C.The site is cut by Tec-city Road and does not form a whole

With the construction of the surrounding road network, the site will evolve into a depression. How to deal with extreme weather such as frequent typhoons and rainstorm in Sanya to ensure the normal growth of ancient trees.

HARDEN ROADS AND ACTIVITY AREAS TO AVOID THE PROTECTION AREA OF ANCIENT TREES, AND USE GRAVEL ROADS WITHIN THE PROTECTION AREA

"Regulations on the Protection and Management of Ancient and Famous Trees in Hainan Province"

It is prohibited to build buildings or structures, lay pipelines, install electrical wires, hardens the ground, dig pits for soil, flood or seal the ground, use open flames, dump waste residue and wastewater, and other harmful substances within five meters of the vertical projection of the crown of ancient and famous trees.

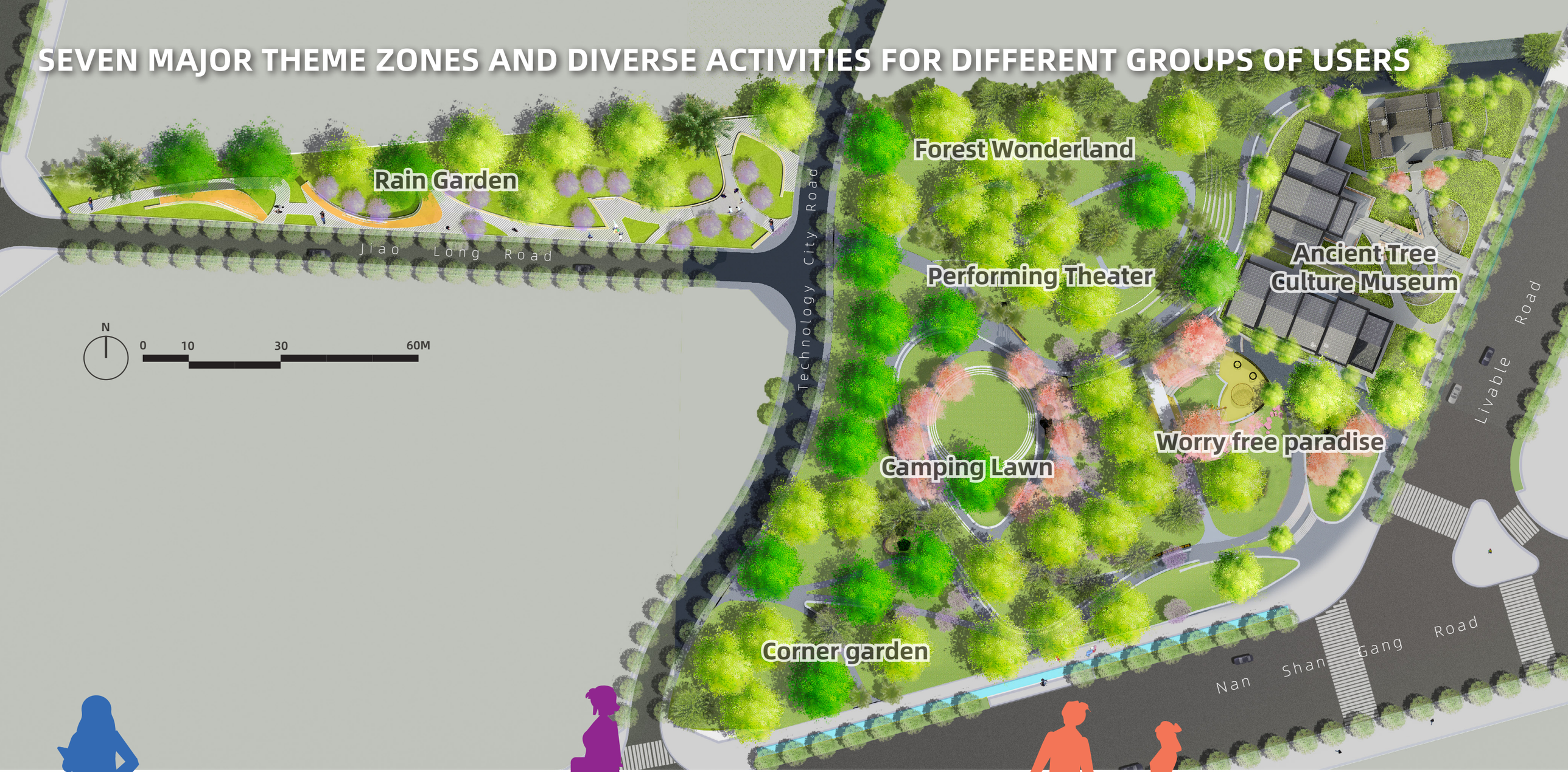
"Several Regulations on the Protection and Management of Ancient and Famous Trees in Sanya City"

It is prohibited to build buildings or structures, develop underground spaces, lay pipelines, install electrical wires, excavate pits and soil, extract stones and sand, flood or seal the ground, use open flames, discharge smoke, dump sewage and garbage, or pile up or dump flammable, explosive, or toxic substances that damage ancient trees and their subsequent resources within the scope of protection.

The protection scope of ancient and famous trees and their subsequent resources shall be determined according to the following provisions:

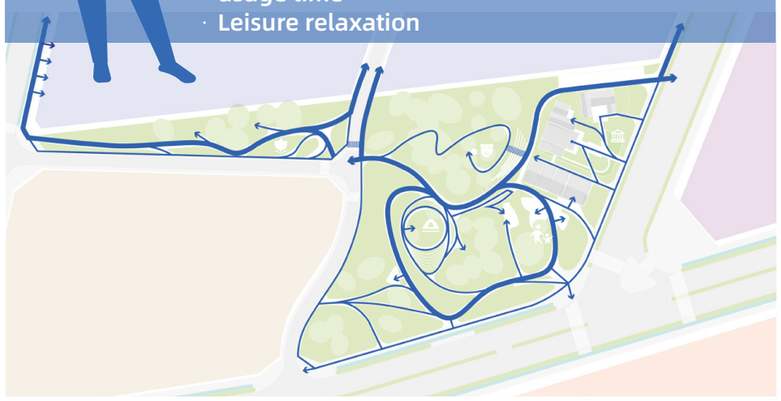
1. The above-ground protection area of ancient and famous trees is within a range of five meters beyond the vertical projection of the tree crown;
2. The above-ground protection area of the ancient tree group is within the range of five meters of the vertical projection extension of the outer side of the edge plant canopy;
3. The above-ground protection range for the follow-up resources of ancient trees is within three meters of the vertical projection extension of the tree crown.

SEVEN MAJOR THEME ZONES AND DIVERSE ACTIVITIES FOR DIFFERENT GROUPS OF USERS



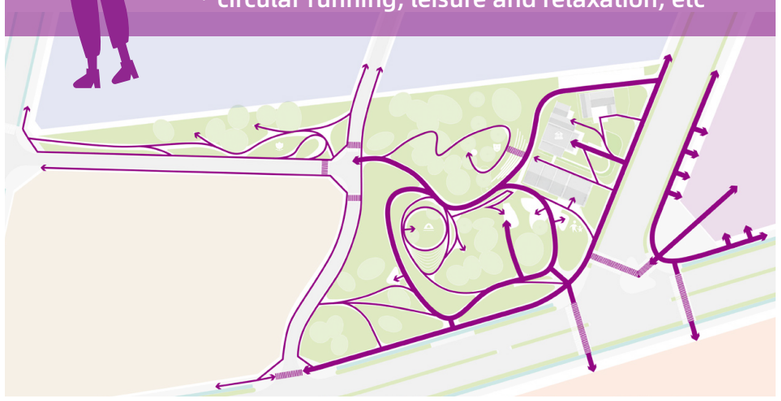
Scientific Researchers

- uninterrupted throughout the day, with short usage time
- Leisure relaxation



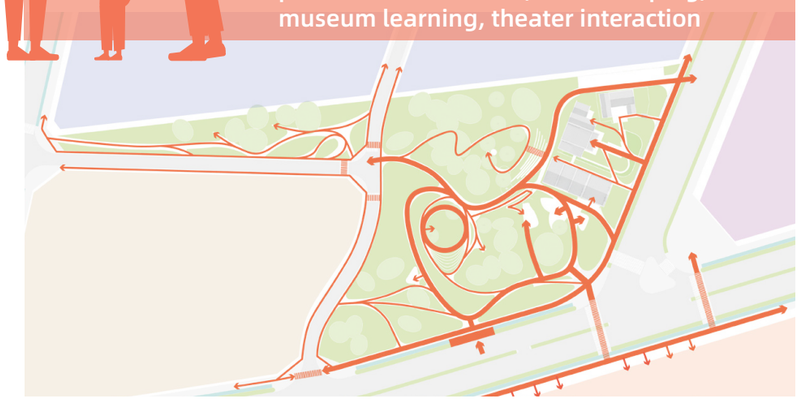
Office Workers

- Noon lunch break and 1-2h in the evening
- circular running, leisure and relaxation, etc



Surrounding Residents

- Weekend Rest Day
- parent-child activities, lawn camping, museum learning, theater interaction



WORRY FREE PARADISE

Transplanting ancient trees

Peak observation gallery

Current situation of ancient trees

Asparagus densiflorus 'Myersii'

Lantana camara L.

Spray cooling

Ruellia simplex C.Wright

Heliconia psittacorum 'Sassy'

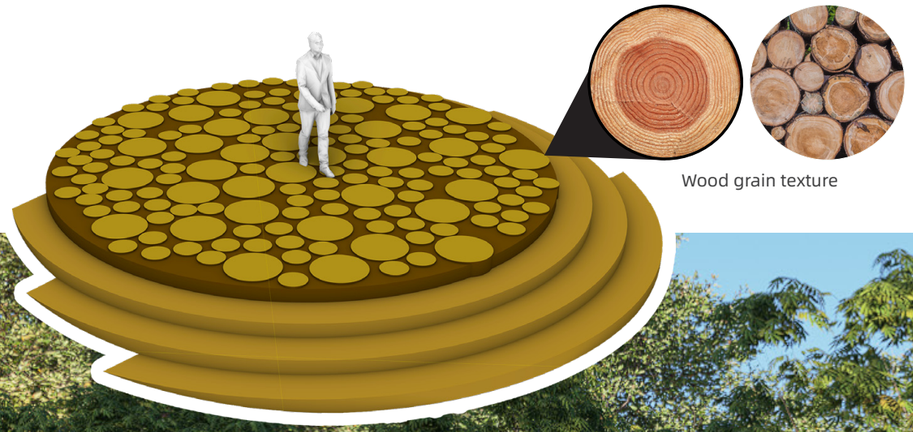
Terrazzo slide

Children's playground

Rest area

Cymbidium goeringii.

PERFORMING THEATER & FOREST WONDERLAND



Wood grain texture

Senna siamea (Lam.) H. S. Irwin & Barneby

Asplenium nidus L.

Nephrolepis exaltata 'Bostoniensis' (L.) Darenport

Transplanting ancient trees

Performing theater

Stone staircase

Unfounded gravel road

CORNER GARDEN

RAIN GARDEN

Current situation of ancient trees

Saraca declinata (Jack) Miq.

Spray cooling

Cymbidium goeringii.

Rhapis excelsa (Thunb.) A. Henry

Hellenia speciosa (J. Koenig) S. R. Dutta

Habranthus.

Tulbaghia violacea Harv.

Resting benches

Science popularization display board

Codiaeum variegatum (L.) Blume

Ruellia britoniana Leonard

RESTORATION OF ANCIENT TREE COMMUNITIES

1

CURRENT VEGETATION EVALUATION

By evaluating the growth status, species diversity, spatial layout, and other aspects of vegetation in the park, the quality of vegetation in the area or site can be determined. To provide fundamental support for the design of sustainable resource management plans and conservation plans.

2

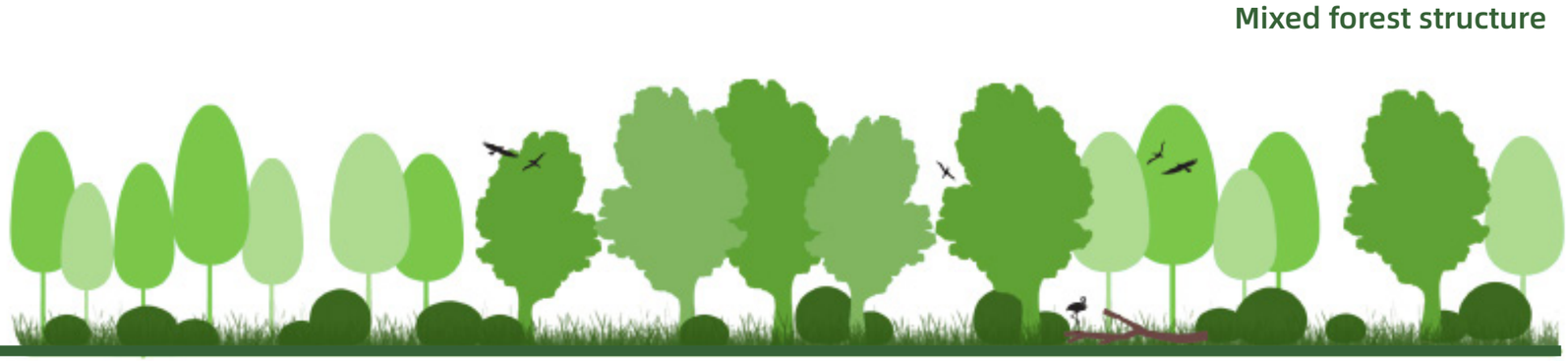
VEGETATION STRUCTURE ADJUSTMENT

Based on the evaluation results of the current situation, analyze the existing vegetation structure problems, and adjust the plant population, replant shade tolerant ground cover, resettle habitats, and introduce and migrate ancient trees to achieve the adjustment of vegetation communities and improve the resilience of the ecosystem to disasters.

3

NEAR NATURAL COMMUNITY VISION

By simulating the natural form, artificial communities with similar community structure, species organization, and regional top-level communities are created. Natural growth and artificially created urban vegetation are fully integrated, and habitat species are actively or passively introduced to establish near natural biological communities.

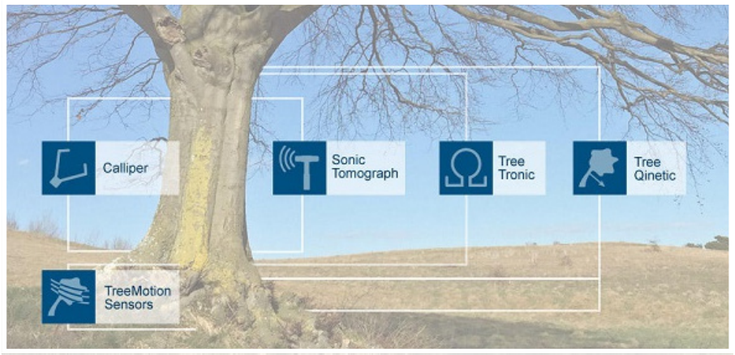


MONITORING OF ANCIENT TREE COMMUNITIES

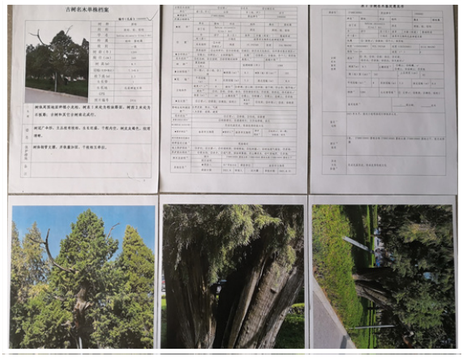
1 FILING AND REGISTRATION

In combination with the construction of the park, establish an ancient tree culture museum, and establish electronic and paper sets of identical technical archives for all ancient trees and famous trees in the park according to the principle of one tree, one file. The archive content should include basic information records of ancient and famous trees, daily maintenance and management records, investigation and diagnosis records, protection technical measures and implementation records, etc.

Electronic archives



Paper archives



2 INTELLIGENT REAL-TIME MONITORING

Establish a monitoring system for ancient and famous trees, which achieves timely grasp and sharing of information on ancient trees, prevention of natural damage, timely prevention of human damage, and timely rescue and rejuvenation through comprehensive real-time monitoring.

Main monitoring content

A. Growth status　　B. Tree damage　　C. Environmental monitoring

Main equipment and instruments

Overall condition observation of trees
(Laser ultrasonic tree height rangefinder)

Monitoring of tree damage
(Acoustic wave detector for tree cross section)

Physiological and metabolic index monitoring
(TRU tree radar detector)

Meteorological and soil monitoring (Automatic monitoring station)

Real-time monitoring of surrounding conditions
(Monitoring probe)

SUBSEQUENT RELOCATION AND MAINTENANCE

RESERVE RELOCATION SITES FOR ANCIENT TREES

The follow-up plan is to relocate 19 ancient trees, including 5 secondary ancient trees and 14 subsequent resources of ancient trees, all of which are Tamarindus.
Within the protected area of ancient trees, non hard bottomed gravel roads are used, and all hardened roads/squares are avoided.

i. The above ground protection range of ancient and famous trees is within a range of five meters beyond the vertical projection of the tree crown;

ii. The above ground protection area of the ancient tree group is within the range of five meters of the vertical projection extension of the outer side of the edge plant canopy;

iii. The above ground protection range for the follow-up resources of ancient trees is within three meters of the vertical projection extension of the tree crown.

SUBSEQUENT MAINTENANCE MEASURES FOR ANCIENT TREES

i. Fertilization

Topdressing outside the roots: Once every two weeks, choose morning and evening or cloudy days for foliar spraying, and spray again in case of rainfall.

Soil fertilization: After the root system sprouts, soil fertilization can be carried out, requiring thin and frequent application of fertilizer.

ii. Crown trimming and protection of new shoots

Crown pruning: Proper pruning to ensure balance between the crown and tree shape.

Protecting Sprouts: Sprouts should be protected by allowing them to sprout and grow. And consciously cultivate the newly sprouted branches to form a good tree shape.

iii. Tree body prevention and protection

Pest control: Proper use of pest control agents without damaging ancient trees. Focus on termite control, set termite traps, spray termite preventive spray, and brush termite drugs.

Tree hole repair: Regular inspections should be conducted, and if there is any decay in the wood of ancient trees, they should be repaired in a timely manner.

WATER MANAGEMENT OF ANCIENT TREES

1 ECOLOGICAL GRASS GULLY SYSTEM

The ecological grass ditch that runs through the entire park can quickly collect and divert rainwater to specific areas for storage during the rainy season, which is used for plant irrigation during drought. Excess rainwater is then connected to the surrounding municipal pipeline network to ensure that ancient trees are not submerged by accumulated water and affect their growth.

2 PERMEABLE PAVEMENT SYSTEM

Determine the size and drainage capacity of each part based on the park's climate, terrain conditions, and rainfall, establish a permeable pavement system that is suitable for the site, use permeable asphalt, permeable bricks, steel grilles, and other materials to build, connect various areas of the park, reduce waterlogging, and improve the overall comfort of the site.

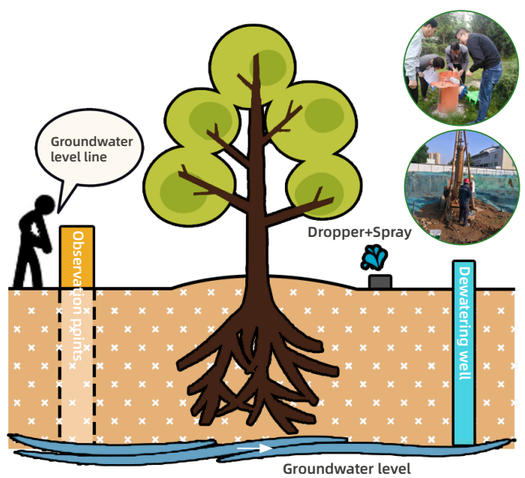
3 LOW INTERVENTION ACTIVITY VENUES

Adhering to the design strategy of prioritizing natural materials, preserving the original ecology, multifunctional design, and miniaturization layout, ensuring the site's water absorption capacity while minimizing interference with the natural environment, preserving the natural appearance, and meeting the needs of different groups of people.

4 WATER MANAGEMENT

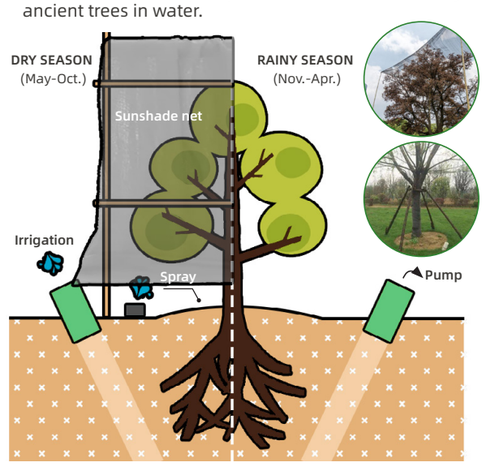
i. Conventional protective measures

- **Set up observation points and precipitation wells:** Observe and analyze the situation of groundwater level, ground subsidence, etc., change the direction of groundwater seepage, and prevent the groundwater level from being too high.
- **Transpiration inhibitor:** Suppress the excessive evaporation of water, dilute the concentrated solution of transpiration inhibitor 20-30 times, and spray the leaf surface with a spray.



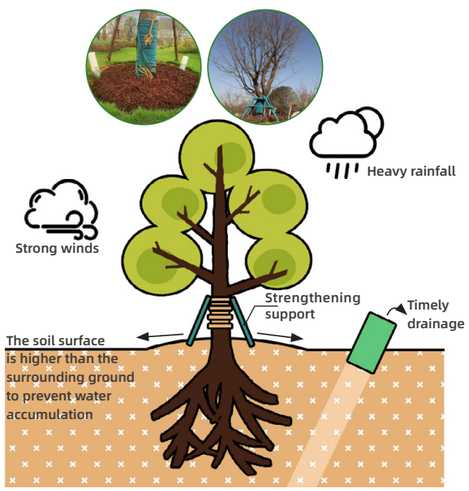
ii. Seasonal measures

- **Dry season management:** from May to October, when the temperature is high and the humidity is low, it can be covered with sunscreen, irrigated with permeable vent pipes, and installed with drip irrigation and spray devices to ensure the water balance of root soil and crown.
- **Rainy season management:** From November to April, there is a lot of rain and high humidity. Use permeable and breathable pipes buried in the bottom of trees to pump water and avoid soaking ancient trees in water.

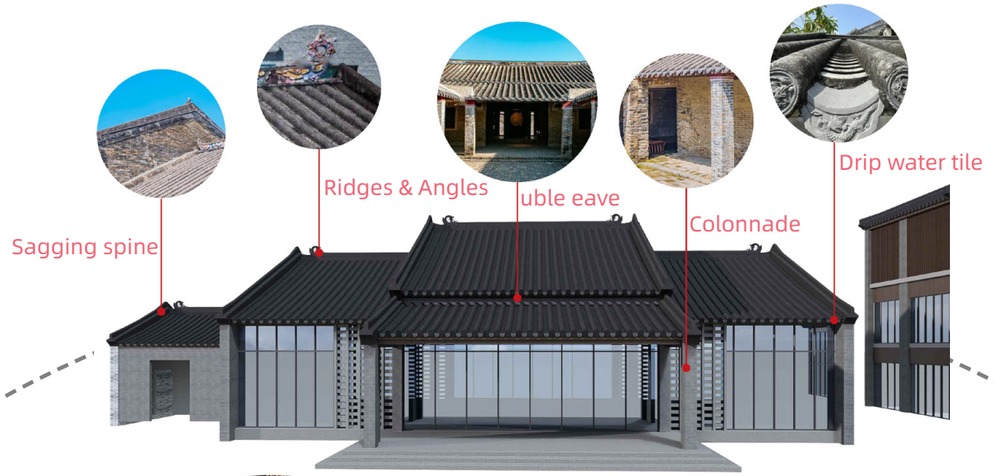


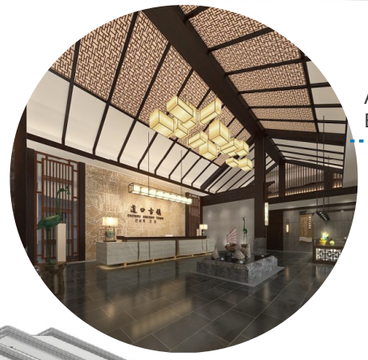
iii. Special weather measures

- **Heavy rainfall weather:** Ensure proper drainage around ancient trees to prevent waterlogging. In low-lying areas prone to water accumulation, breathable materials can be laid and drainage pipes can be laid to ensure timely drainage on rainy days.
- **Gale weather:** Organize personnel to take measures to protect tree branches, such as strengthening support and appropriate pruning.

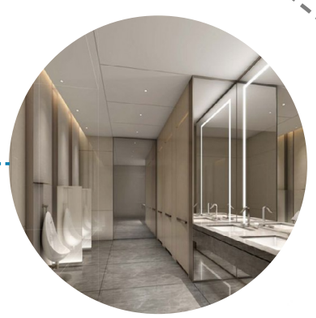


ANCIENT TREE CULTURE MUSEUM

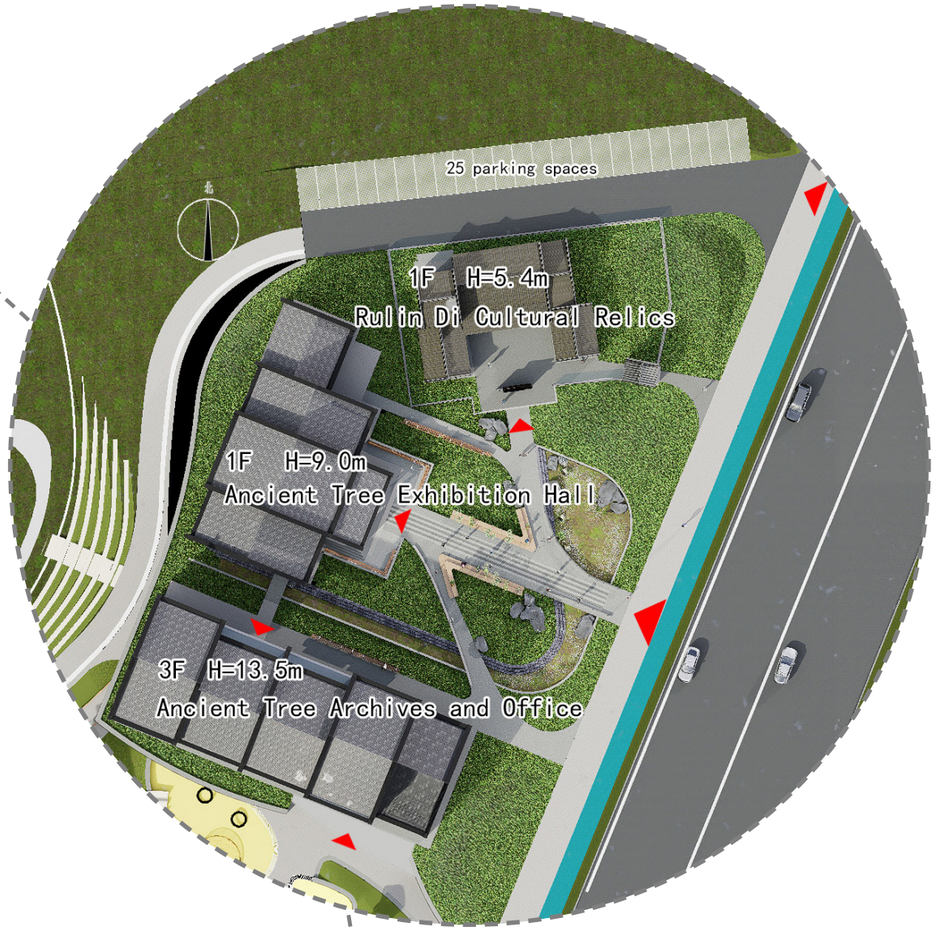


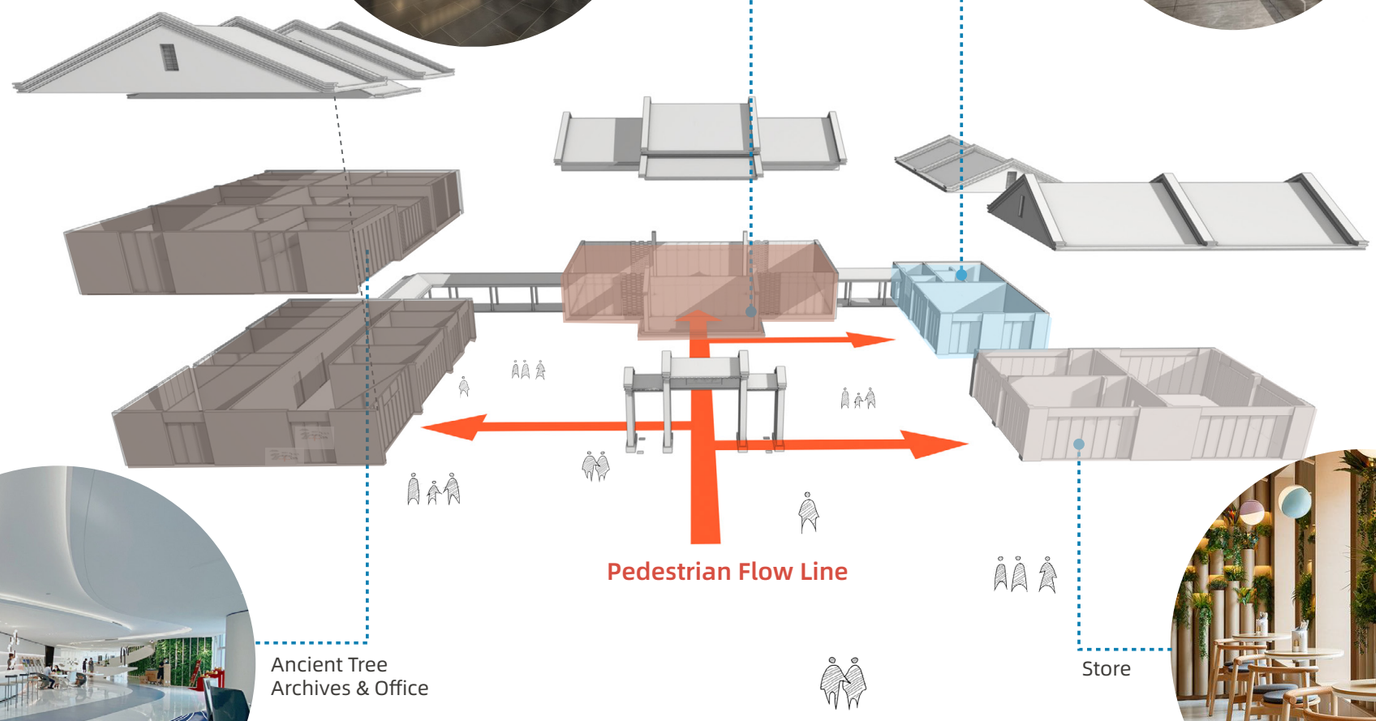


Ancient Tree
Exhibition Hall



Toilet





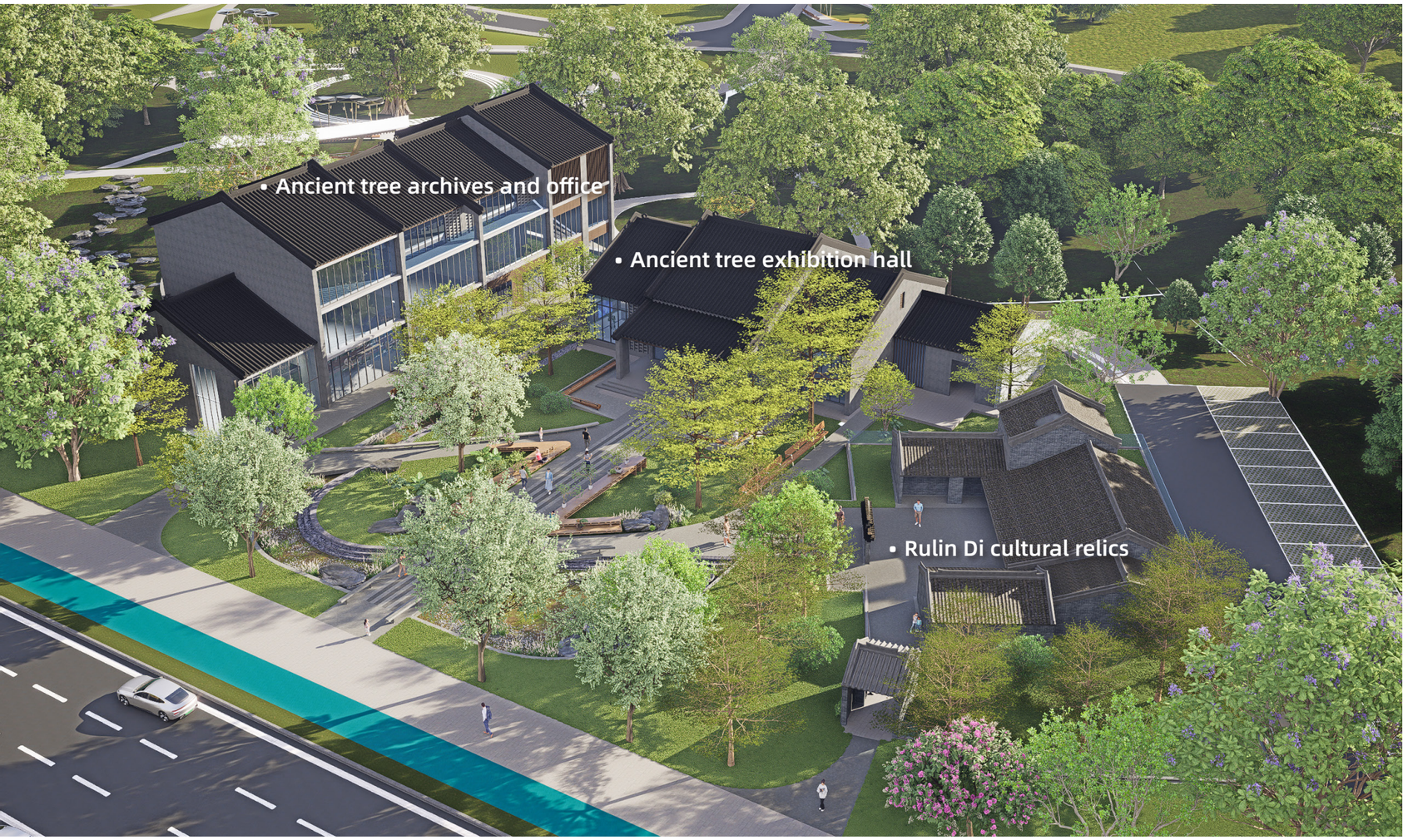
Ancient Tree
Archives & Office

Store

Total construction area: 2482.3 m²

- Ancient Tree Exhibition Hall 484.45 m²
- Ancient Tree Archives and Office 1916.89 m²
- Rulin Di Cultural Relics 300 m²
- Toilet 80.96 m²

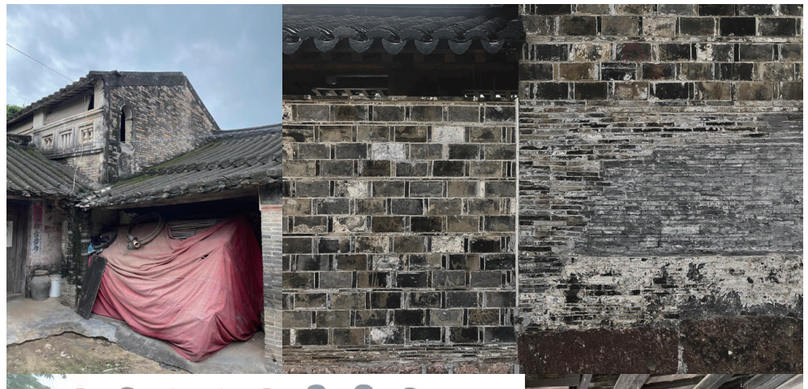
ANCIENT TREE CULTURE MUSEUM

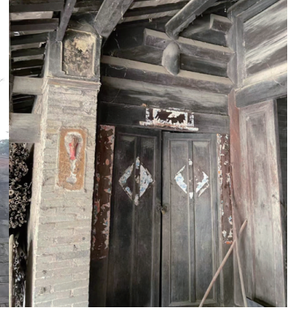


RULIN DI CULTURAL RELICS - RELOCATE TO ANCIENT TREE PARK FOR OVERALL JOINT PROTECTION

RULINDI: NAME THIS BUILDING WITH AN OFFICIAL NAME TO INDICATE ITS HIGH STATUS AND PRESTIGE

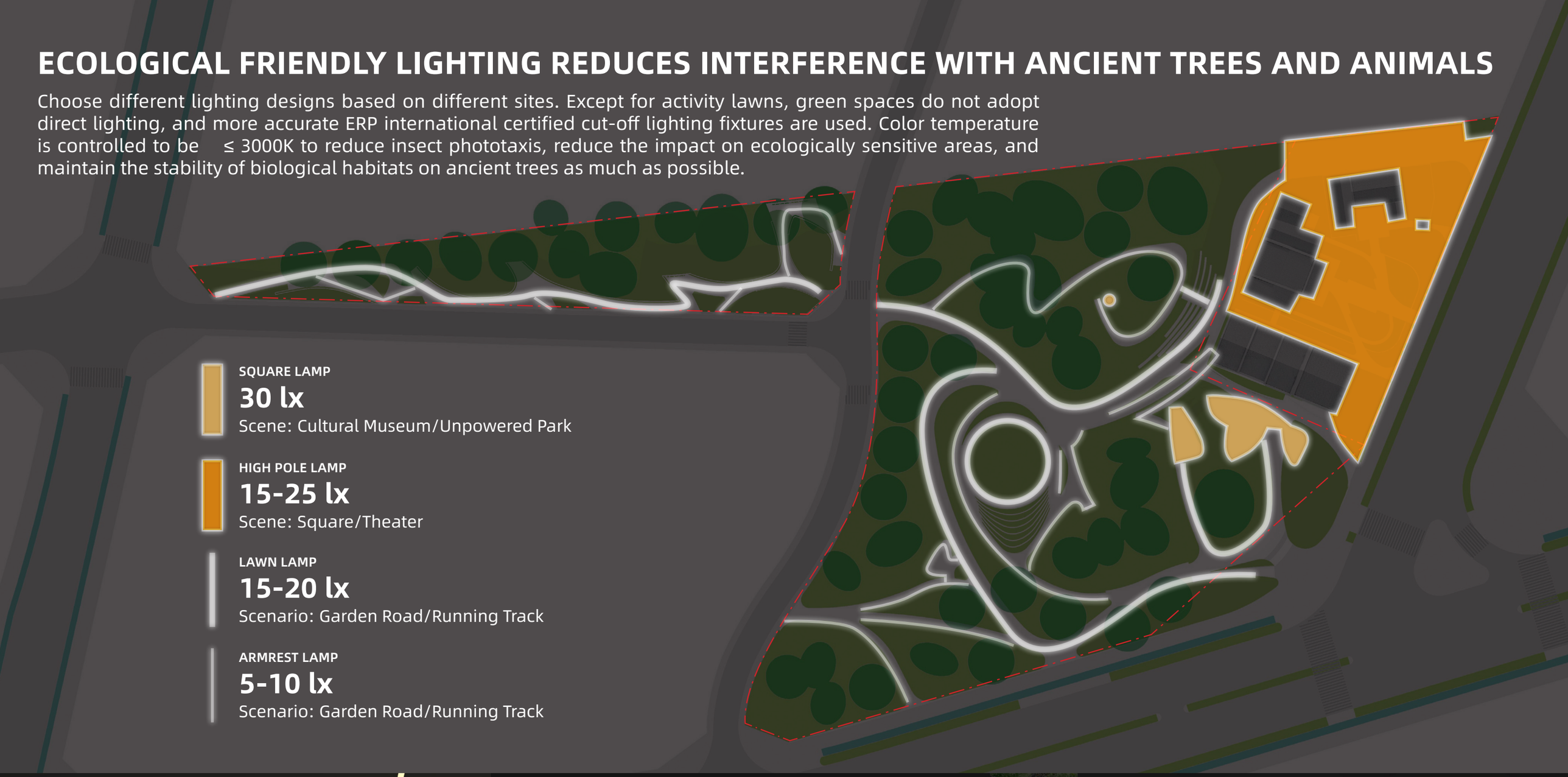
Location: Dadan Village, Yazhou District, Sanya City, Hainan Province
Type: Ancient Architecture
Construction period: Qing Dynasty
Cultural Relics Composition: The building area of Rulin Mansion is about 320 square meters. The house faces west and east, and the existing buildings mainly consist of a gatehouse, screen walls, main hall, left and right wing rooms, side rooms, etc. The length from north to south is 16 meters, and the width from east to west is 20 meters. The main structure is a single layer brick and wood structure, with clear water walls. The roof structure is made of original wooden purlins, wooden rafters, and gray cylindrical tile double slope roofs.





ECOLOGICAL FRIENDLY LIGHTING REDUCES INTERFERENCE WITH ANCIENT TREES AND ANIMALS

Choose different lighting designs based on different sites. Except for activity lawns, green spaces do not adopt direct lighting, and more accurate ERP international certified cut-off lighting fixtures are used. Color temperature is controlled to be ≤ 3000K to reduce insect phototaxis, reduce the impact on ecologically sensitive areas, and maintain the stability of biological habitats on ancient trees as much as possible.



SQUARE LAMP

30 lx

Scene: Cultural Museum/Unpowered Park

HIGH POLE LAMP

15-25 lx

Scene: Square/Theater

LAWN LAMP

15-20 lx

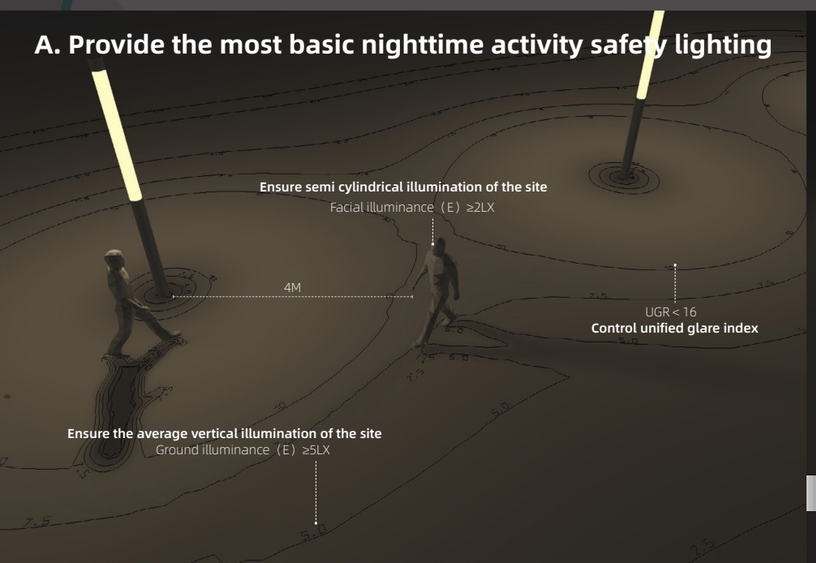
Scenario: Garden Road/Running Track

ARMREST LAMP

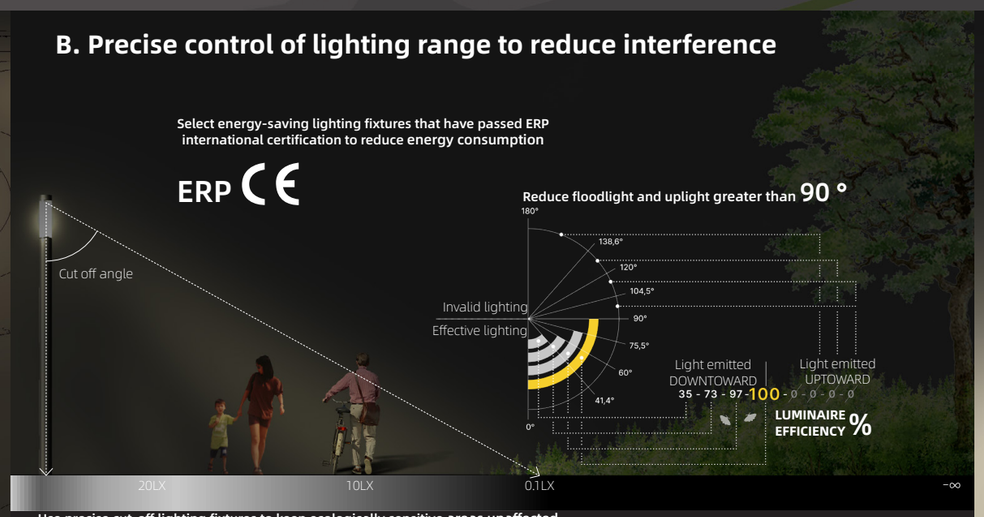
5-10 lx

Scenario: Garden Road/Running Track

A. Provide the most basic nighttime activity safety lighting



B. Precise control of lighting range to reduce interference



C. Focusing on warm light to reduce insect phototaxis